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A

SYSTEM OF SURGERY.

BY

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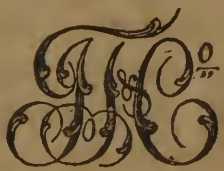
IN FOUR VOLUMES.

ILLUSTRATED WITH ONE HUNDRED COPPERPLATES.

VOLUME I.

THE FIRST *AMERICAN* EDITION, CORRECTED.



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MDCCXCI.

PREFACE.

IN an undertaking ſo arduous and ſo extenſive, as a General Syſtem of Modern Surgery, it may be proper to explain the reaſons which induced me to enter upon it, and to point out the plan upon which I have proceeded.

The learned and judicious Heiſter publiſhed the laſt edition of his Syſtem of Surgery ſo long ago as the year 1739. In this work, the author comprehends whatever the experience of former times had approved as uſeful; and adds ſuch obſervations as his own knowledge in Anatomy and practice in Surgery ſuggeſted.

This was the firſt, and it ſtill remains the only, complete Syſtem of Surgery of which we are poſſeſſed.

Since this publication of Heiſter's, many valuable diſcoveries and important improvements have been introduced; and the Public has at different times been favoured with ac-

counts

counts of them by their reſpective authors. But theſe publications treat of various ſubjects, and are all neceſſarily unconnected with each other; ſo that the additional knowledge with which our art has been of late enriched, lies in a very diffuſed, and to many perhaps in an inacceſſible, ſituation.

It is true, that ſome attempts have been made towards a full ſyſtematic arrangement of chirurgical ſubjects. Platner publiſhed his Inſtitutes of Surgery in the year 1745; and Ludwig favoured the world with a ſimilar publication in 1767. But both theſe works may be properly conſidered as heads of lectures which were read by thoſe celebrated profeſſors at Leipſic; and although poſſeſſed of much merit, they are too conciſe to give a clear and diſtinct idea of the various topics of which they treat.

In conſequence of this, the young ſtudent in the art, as well as the intelligent practitioner who is deſirous of information, is obliged to conſult a great variety of publications, which he frequently finds much difficulty in procuring, and which his other occupations will not always allow him ſufficient time to peruſe.

Induced

Induced by these considerations, and having frequently experienced much inconvenience from the want of a well digested System of Surgery, I have been led to attempt the present work: Which, though it may not afford much new information to practitioners of experience and reflection, who are accustomed to peruse every publication that appears; yet to the younger part of the profession, and to all those whose opportunities of acquiring knowledge have not been considerable, I flatter myself it may prove serviceable.

I have exhibited a view of the art of Surgery, as it is at present practised by the most expert surgeons in Europe, as far at least as my own observation in the course of attending different Hospitals, joined to the advantages of reading and correspondence, have enabled me so to do.

It may be proper to remark, that a number of improvements suggested at different times in various parts of Surgery, are here purposely omitted. Within these last thirty or forty years, such a rage has prevailed for the invention of new instruments, that it has become fashionable to accompany every publication

with

with ſomething new and ſingular of this kind. Some of theſe have undoubtedly been productive of much advantage: But the greateſt part of them tend more to evince the ingenuity of their authors, than to render the operations for which they were intended, more eaſily accompliſhed; for, although facility in performance is one great object in every ſurgical operation, yet the ends we have in view are in general attained by very ſimple means.

Indeed, one object of the preſent publication is, an endeavour to diveſt the art of all that uſeleſs machinery with which it has been encumbered; and to retain only what appears evidently to reſt upon the ſolid baſis of experience. I have therefore been particularly attentive, in admitting nothing which I have not myſelf found confirmed by trial, or which I have not known to prove uſeful in the hands of others.

My connection with a large hoſpital, the Royal Infirmary of Edinburgh, to which the greateſt part of the poor in Scotland requiring the aſſiſtance of chirurgical operations, are accuſtomed to reſort, together with that private practice which has fallen to my ſhare,

have

have given me opportunities both of repeatedly performing every operation myſelf, and of being frequently preſent when they were performed by ſome of the moſt expert ſurgeons of this place; a circumſtance which enables me to ſpeak with ſome degree of confidence, though, I hope with due caution, of each. Without ſuch advantages, I ſhould not have thought myſelf juſtifiable in undertaking the preſent Work; for it is chiefly by hoſpital practice that any individual can acquire ſuch experience in the great variety of chirurgical operations, as to be able to form any accurate ideas concerning them.

I have not in the courſe of the following Work, attempted a particular ſyſtematic arrangement of the ſubjects of which it treats. Arrangements of this kind have indeed been employed with advantage in different branches of ſcience: The ſtudy of natural hiſtory has been much facilitated by their means; and a knowledge of the more general diſeaſes to which the human body is liable, is perhaps acquired with more eaſe by the comprehenſive views which a well digeſted noſological ſyſtem gives of them. But, as diſorders of every kind

requiring

requiring the aſſiſtance of the operative part of Surgery, are perfectly local and unconnected with one another by means of ſymptoms common to each; and as it ſeldom happens, that there is much ſimilarity in the means neceſſary for the removal of ſuch diſeaſes; the parade of claſſification under ſuch circumſtances, although it may ſerve to diſplay the fancy of an author, can have no effect either in rendering the ſtudy of Surgery more eaſy, or the practice of it more attainable.

Yet when one ſubject is naturally connected with another. I have not any where attempted to ſeparate them; and when the deſcription of any operation can be more eaſily underſtood from what has been ſaid concerning another, I have conſidered them in immediate ſucceſſion: But, in other inſtances, where no connection can be traced between the different articles treated of, no methodical arrangement can be with advantage attempted.

Were I to endeavour to trace the ſucceſſive improvements which have been made in ſurgery within theſe laſt fifty or ſixty years, I ſhould often find it difficult, and ſometimes impoſſible, to determine by whom the prac-

tice

tice, as it is now eſtabliſhed, was introduced; and in order to give a fair account of the progreſs of the different operations of ſurgery from their rude to their improved ſtate, I ſhould be under the neceſſity of entering into a full chronological hiſtory of each. While inquiries of this kind could ſerve no uſeful purpoſe, they would tend to render more prolix, a work which, from the variety of its ſubjects, muſt neceſſarily extend to a great length. I ſhall therefore in general decline them. On ſome occaſions, however, when the author of any remarkable improvement is known with certainty, I ſhall not fail to give him all the credit which his diſcovery ſeems to merit.

Such of my readers as are fond of theoretical diſquiſitions, will, I am afraid, be frequently diſappointed. When the ſubject under conſideration can be rendered more clear and intelligible by it, I have occaſionally employed ſuch reaſoning as experience and common ſenſe ſeem evidently to ſupport; but I have every where ſtudiouſly guarded againſt entering on the diſcuſſion of doubtful and ſpeculative opinions.

In

In conſidering the different ſubjects, the appearance or ſymptoms of the diſorder—the uſual cauſes known to induce it—its probable conſequences—and the beſt method of treatment—are particularly deſcribed in ſucceſſion : And when an operation of importance is to take place, the parts which lie contiguous, but which the operator ought to avoid, are pointed out, as well as thoſe which he is under a neceſſity of dividing.

In deſcribing the different operations, I have uniformly adhered to the method at preſent practiſed by the beſt ſurgeons, excepting in ſuch inſtances where improvements of my own are propoſed ; and none of theſe are any where recommended, the utility of which has not been aſcertained by repeated trials.

In a work of this nature, it muſt unavoidably happen, that on ſeveral occaſions I differ in opinion from various reſpectable authors ; but wherever I do ſo, no other motive, I hope, will appear for it, than a wiſh to render more perfect an art which I am attempting to deſcribe and illuſtrate.

I was fully aware of the difficulties to be encountered in carrying on and completing this

this design; and was so diffident of my abilities to do justice to the undertaking, that, even after a considerable part of the materials were prepared, I chose the mode of publishing it in separate volumes, that I might thereby have an opportunity of discovering the sentiments of the public with regard to its merit and utility; a circumstance, by which I was in a great measure determined in the farther execution of my plan.

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A TREATISE
ON THE
THEORY AND PRACTICE
OF
SURGERY.

CHAPTER I.
OF SUTURES.

SECTION I.
Of SUTURES *in General.*

A S futures of one kind or another are found neceſſary, not only in every large wound, but in almoſt every operation of importance, the conſideration of this ſubject ſeems firſt to require our attention.

A variety of futures have been practiſed by ſurgeons, each of which has from long experience been applied to a particular purpoſe, viz. The interrupt-

ed ſuture; the quilled ſuture; the glover's and the twiſted ſuture. Many others are enumerated by ancient writers: But the four now mentioned are the only ſpecies of ſutures at preſent in ordinary uſe; and even of theſe, ſome, we think, might with propriety be omitted.

The intention of every ſuture, is to unite parts, which either by accident or deſign have been divided. Another mode of effecting this, is through the intervention of adheſive plaſters: And this by ſurgeons has been termed the falſe or dry ſuture; in oppoſition to the others performed by the needle, which are denominated the true or bloody ſuture.— But as the conſideration of this ſubject, namely, the uſe of adheſive plaſters in wounds, will be more properly introduced in a ſubſequent part of this work, we ſhall not in this place enter upon its diſcuſſion.

SECTION II.

Of the Interrupted Suture.

IN deep wounds, when a reunion of the divided parts is intended, this is the ſuture to which we generally have recourſe; but from what will be afterwards more fully explained when treating of wounds, and from what will preſently farther appear, it does not ſeem to be ſo well adapted to this purpoſe as the twiſted ſuture. When it is determined, however, to make trial of the interrupted ſuture, the following is the eaſieſt mode of doing it.

In every wound where ſutures are found neceſſary for the retention of parts, it has commonly been conſidered as good practice, to carry the needle and ligature to the bottom of the ſore, ſo as to give as little room as poſſible for matter collecting underneath; and the uſual mode of effecting this, is by introducing the needle from without inwards, and

again

again from the bottom of the wound to the ſame diſtance on the oppoſite ſide. But this ſuture, it may be remarked, is much more neatly, and at the ſame time more eaſily performed, by paſſing both ends of the thread from within outwards; which is readily done by uſing two needles upon each thread, inſtead of one. A needle being put upon each end of the ſame thread, and each needle being inſerted at the bottom of the ſore, and puſhed outwardly ſo as to paſs out at a proper diſtance from the edge of the wound, the needles are then to be taken off, and the threads allowed to remain till all the ligatures are paſſed which the extent of ſore ſeems to require.

The number of ligatures neceſſary for any wound, muſt in a great meaſure depend upon the extent of divided parts. By authors in general it has been laid down as an eſtabliſhed rule, that one ſuture is fully ſufficient for every inch of wound. It will frequently indeed happen, that this number is found ſufficient; but in ſome inſtances, particularly where muſcular parts are deeply cut tranſverſely, and where conſequently a great degree of retraction occurs, a greater number of ſtitches are neceſſary: Whenever a number of angles, too, occurs in a wound, more ligatures are required than in a ſtraight wound of the ſame extent; for, at every angle, however inconſiderable it may be, there ought to be a ſuture.

In paſſing the ligatures, great care is neceſſary to pierce the ſkin at a ſufficient diſtance from the edge of the wound: For if they do not comprehend a thickneſs of parts in ſome meaſure proportioned to the depth of the wound, and to the extent of retraction which may be expected, they will very readily cut through the parts entirely.—By ſome authors we are directed to enter the ligatures, at a diſtance from the edges of the ſore nearly equal to the depth of the wound. This rule, however, will by no means be found to anſwer in practice. Thus, in a

very

very deep wound, for inſtance of about three inches, no neceſſity can occur for carrying the ligatures three inches from the edges of the ſore; and again, in very ſuperficial cuts, it ſometimes happens that the ligature ought to be paſſed out at a diſtance from the edges of the wound greater than its depth. It ought not, in almoſt any caſe, to be leſs than half an inch from the edge of the ſore; and it will ſeldom happen, even in the largeſt wounds, that an inch is not found to be a ſufficient diſtance.

It will be readily underſtood, that the ſtrength of the ligature and ſize of the needle ought always to be proportioned to the depth of the ſore and retraction of parts. The ſeveral ſizes of needles repreſented in Plate I, are ſuch as have been found neceſſary in practice; and the ligatures to be uſed along with them ought to be ſuch as nearly, though not entirely, to fill the eyes of the different needles. In order to make the ligatures paſs more eaſily, to render them more durable, and at the ſame time to make them more ſuſceptible of a flattened form, which does not ſo readily cut through the contained parts as a round one, they ought all to be well covered with fine beeſwax.

As ſoon as the threads are all paſſed, the lips of the wound ought to be preſſed together and ſupported by an aſſiſtant till all the ligatures are firmly tied; beginning either in the middle of the wound, or at one end, as the operator inclines. In tying the knots, it is uſual to paſs the ends of the threads twice through the firſt nooſe, in order to prevent their yielding; and when this is done, it is alleged by ſome that there is no neceſſity for more than one knot upon each ligature; but as two knots are very eaſily made, and as every chance of their yielding is thereby effectually prevented, this precaution ought never to be omitted. It is a practice with ſome ſurgeons, to inſert a piece of lint between the firſt and ſecond knots, or between the firſt knot

and

Plate I.

Fig. 1.

Fig. 2.

Fig. 3.

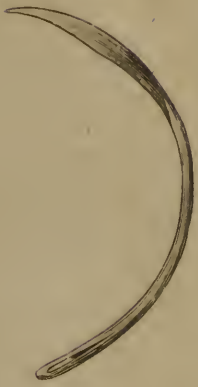


Fig. 5.

Fig. 6.

Fig. 4.

Fig. 7.

and the skin below, in order to save the parts underneath from the pressure of the knots; but as in reality all such means of protection afford no advantage of importance, and as they prevent the knots from being made with exactness, they ought therefore to be laid entirely aside.

By some writers on this subject, we are desired not to bring the knots of ligatures immediately upon the edges of the wound, but rather to carry them to one side, over upon the sound teguments: But whoever has tried both methods, will at once be sensible, that this is by no means an improvement; for in no way can both sides of the sore be equally supported, but by the knots being passed immediately above the lips of the divided parts.

SECTION III.

Of the QUILLED SUTURE.

AS the quilled suture is still employed by some practitioners, it is here thought necessary to describe the mode of performing it.

In deep wounds attended with much retraction, it is always a necessary precaution, to assist the operation of the ligatures, by means of bandages so applied as to afford as much support as possible to the divided parts: But, even with every assistance of this nature, it now and then happens, that the divided parts cannot be kept together, retraction occurs to a greater or lesser degree, and the ligatures of course cut asunder the soft parts they were at first made to surround.

With a view to prevent this receding of the teguments and other parts, it was long ago proposed to add to the interrupted suture what was supposed would afford an additional support; viz. quills, or pieces of plaster rolled up into the form of quills; one of which being placed on each side of the wound,

wound, the doubling of the ligature is made to include the one, and the knot to preſs directly upon the other, inſtead of being made immediately on the edges of the ſore as was directed for interrupted ſutures.

It is at once evident, however, that the ligatures muſt here make the ſame degree of preſſure on the parts though which they paſs, as they do in the interrupted ſuture; and this being the caſe, it is equally obvious, that the interpoſition of theſe ſubſtances cannot be of any uſe. This ſuture is accordingly now very rarely practiſed, and it is probable that it will be ſoon laid entirely aſide.

SECTION IV.

Of the GLOVER'S SUTURE.

THIS ſuture receives its name from being that which the glovers commonly uſe. As it is exceedingly ſimple, and very univerſally known, it does not here require a particular deſcription: We ſhall therefore juſt ſhortly obſerve, that it conſiſts in a ſeries of ſtitches all connected with one another, and continued in an oblique ſpiral direction along the courſe of the divided parts intended to be kept together.

This ſuture has hitherto been univerſally employed for reuniting ſuch parts of the inteſtines as have been divided by wounds: But, when treating of accidents of this kind, I ſhall endeavour to ſhow, that the ſame end may be more perfectly attained, and probably with leſs danger, by means of the interrupted ſuture; ſo that as this ſuture has almoſt never been applied to any other purpoſe, it will likewiſe in all probability ſoon fall into diſuſe.

SECTION

SECTION V.

Of the TWISTED SUTURE.

BY the term Twiſted Suture is meant, that ſpecies of ligature, by which parts, either naturally or artificially ſeparated, are united together, by means of ſtrong threads properly twiſted round pins or needles puſhed through the edges of the divided parts.

This ſuture is commonly employed for the purpoſe of uniting the parts in caſes of harelip; and this indeed is almoſt the only uſe to which it has been hitherto applied: But we may here remark, that it may with great advantage be put in practice in a variety of other caſes, particularly in all artificial or accidental diviſions either of the lips or cheeks; and, in every wound in other parts that does not run deep and in which ſutures are neceſſary, this ſuture is preferable to the interrupted or any other.

In very deep wounds, for inſtance in all wounds extending to a greater depth than an inch and a half, the interrupted ſuture is the only one that is admiſſible; for, in all ſuch deep cuts, the pins neceſſary in the twiſted ſuture cannot with propriety be employed, as they cannot be introduced to ſuch a depth, and afterwards ſo twiſted with ligatures as to reunite the divided parts, without great pain to the patient. In ſuch wounds, therefore, we muſt of neceſſity have recourſe to the interrupted ſuture. But it may be here remarked, that wounds of this depth requiring the aid of ſutures, are very rarely met with: So that, in by much the greateſt proportion of wounds where ſutures are adviſable, the twiſted ſuture will be found practicable; and whenever it is ſo, it ought certainly to be preferred to every other, as being obviouſly better calculated, even than the interrupted ſuture, for the retention

of

of divided parts. The pins made uſe of for twiſting the threads upon, ought to be made of a flat form, ſo as not to cut the parts through which they paſs, ſo readily as the ligatures employed in the interrupted ſuture: And thus one great objection to the latter is very effectually obviated; for, every practitioner muſt be ſenſible of this being the greateſt inconvenience attending the interrupted ſuture, that when muſcular parts are divided, ſo as to produce much retraction, the ligatures employed for retaining them, almoſt conſtantly cut them through before a reunion is accompliſhed; whereas, the flatneſs of the pins uſed in the twiſted ſuture, and upon which, it may be remarked, the whole preſſure produced by the ligatures is made to reſt, proves in general a very effectual preventative againſt this occurrence.

The pins uſed in this operation have commonly been made of ſilver; and, in order to make them paſs with greater eaſe, ſteel points have been added to them. As gold pins, however, are capable of receiving a ſufficient degree of ſharpneſs, which renders the intervention of ſteel points quite unneceſſary; and as gold is more cleanly than ſilver, from its not acquiring ſo readily that kind of cruſt which immerſion in fluids is apt to produce upon the other; pins of this metal are therefore preferable.

The form and ſize of pins repreſented in Plate II, are what experience has ſhown to be the moſt uſeful for every ordinary purpoſe; but, for particular uſes, the ſize muſt no doubt be ſubject to variations.

The manner of performing this operation is as follows: The divided parts intended to be reunited, muſt by the hands of an aſſiſtant be brought nearly into contact; leaving juſt as much ſpace between the edges of the ſore, as to allow the ſurgeon to ſee that the pins are carried to a proper depth.

Plate II.

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

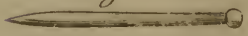


Fig. 5.

depth. This being done, one of the pins muſt be introduced through both ſides of the wound, by entering it on one ſide externally, puſhing it forwards and inwards to within a little of the bottom of the wound, and afterwards carrying it outwardly through the oppoſite ſide, to the ſame diſtance from the edge of the ſore that it was made to enter at on the other.

The diſtance at which the needle ought to enter from the edge of the ſore, muſt be determined by the depth of the wound, and by the degree of retraction produced in the divided parts. In general, however, it is a proper rule in deep wounds, to carry the pins to a diſtance from the edges of the ſore, nearly the ſame with the depth to which they penetrate : And it may be alſo remarked, that, whatever the deepneſs of the wound may be, the pins ought to paſs within a very little of its bottom ; otherwiſe the parts which lie deep will run a riſk of not being united ; a circumſtance which will frequently give riſe to troubleſome collections of matter.

In paſſing the pins through the different ſides of the wound, if the ſkin and other teguments are not more firm than ordinary, it may commonly be done by the fingers alone, and particularly if the pins are made with ſmall heads or knobs for the fingers to preſs upon ; but when firmneſs of parts and other circumſtances render the entrance of the pins difficult, the inſtrument termed Porteaiguille very effectually removes this inconvenience.—In Plate II. is repreſented the moſt convenient form of this inſtrument that has yet been invented.

The firſt pin being paſſed in this manner very near to one end of the ſore, and the parts being ſtill ſupported by an aſſiſtant, the ſurgeon, by means of a firm waxed ligature paſſed three or four times round and acroſs the pin, ſo as nearly to deſcribe the figure of 8, is to draw the parts through which it has paſſed into cloſe contact ; and the thread be-

ing now ſecured with a looſe knot, another pin muſt be introduced in the ſame manner at a proper diſtance from the former; and the thread with which the other was fixed, being looſed, and in the ſame manner carried round this pin, others muſt be introduced at proper diſtances along the whole courſe of the wound, and the ſame ligature ought to be of a ſufficient length for ſecuring the whole.

The number of pins to be uſed, muſt be determined entirely by the extent of the wound. Whenever the ſuture, however, is practiſed, whether the wound be large or of very ſmall extent, a pin ought to be introduced very near to each end of it, otherwiſe the extremities of the ſore are apt to ſeparate ſo as not to be afterwards eaſily reunited. In large wounds, if the pins be introduced at the diſtance of three quarters of an inch from one another, it will in general be found ſufficient; but, in cuts of ſmaller extent, a greater number of pins become neceſſary in proportion to the dimenſions of the ſores.

Thus, in a wound of an inch and half in length, three pins are abſolutely requiſite; one near to each end, and another in the middle of the ſore: Whereas, five pins will always be found fully ſufficient for a wound of three inches and a half in extent, allowing one to be within a quarter of an inch of each extremity of the wound, and the others to be placed along the courſe of the ſore at the diſtance of three quarters of an inch from one another.

The pins being all introduced and ſecured in the manner directed, nothing remains to be done, but to apply a piece of lint wet with mucilage, all along the courſe of the wound, with a view to exclude the external air as effectually as poſſible.

In order to prevent the ends of the pins from preſſing upon and hurting the ſkin below, it is uſual to apply a ſmall bolſter of linen or charpie under each of them; but as this always does miſchief, by tending to preſs upon the pins, ſo as to force them

to

to act upon the soft parts through which they have passed, every thing of this kind ought to be omitted. When, however, the patient happens to complain of being hurt by the ends of the pins, this may be easily prevented by introducing between them and the skin pieces of thin linen spread with any adhesive plaster.

In order to give every chance of success to this operation, it has been commonly advised, immediately after the pins are secured, to apply the uniting bandage over the whole, so as to afford as much support as possible to the contiguous parts. The least reflection, however, renders it evident, that every degree of pressure made in this manner must do mischief; for, the bandage being made to rest immediately upon the pins, a considerable degree of pain and consequent inflammation must of course be produced by it: And in fact this is so much the case, that, in every instance in which I have seen this bandage applied, it either did harm, by exciting inflammation in consequence of too much pressure upon the pins; or, if that effect was not produced, no advantage was received from it, from the bandage not being applied with such tightness as to afford any support whatever to the parts below.

The next point to be determined, is, the time the pins should be allowed to remain. When they remain long, they generally do harm, by the unnecessary irritation and consequent retraction of parts with which they are always attended; and again, if they are not continued for a sufficient length of time, that degree of adhesion is not produced between the divided parts that is necessary for their future retention, so that the effect of the operation comes to be in a great measure, if not entirely, lost.

In wounds of no great depth, for instance of about three quarters of an inch, a sufficient degree of adhesion always takes place in the space of five days; and six, or at most seven days, will generally

ly be found ſufficient for wounds of the greateſt depth.

But with reſpect to this circumſtance, it muſt always be underſtood, that the patient's ſtate of health will have a conſiderable influence on the time neceſſary for producing adheſion between divided parts. In ſpecifying the time required for this purpoſe, the operation is ſuppoſed to have been done in a ſound and healthy ſtate of the conſtitution. When the patient labours under any diſorder which affects the general ſyſtem, by cutaneous eruptions or otherwiſe, it is impoſſible to aſcertain this circumſtance with preciſion : In ſuch caſes we muſt be determined by the nature and ſtate of the diſeaſe preſent at the time.

As ſoon as the pins are withdrawn, the uniting bandage may be applied with great advantage in order to ſerve as a ſupport to the parts newly united ; but, as ſlips of leather ſpread with ordinary glue, when applied to each ſide of the cicatrix, may, by means of ligatures properly connected with them, be made to anſwer this purpoſe in a more effectual manner, this mode of ſupporting the parts ought of courſe to be preferred.

As the twiſted ſuture when properly performed is a very neat operation, as its conſequences are in general of importance, and as it may with much advantage be made to ſuperſede the uſe of almoſt every other ſuture, a few inſtances only excepted, I have therefore thought it proper to conſider it with more attention than has hitherto been commonly beſtowed upon it.

CHAP.

CHAP. II.

Of the LIGATURE of ARTERIES and other MEANS employed by ART for putting a STOP to HEMORRHAGIES.

In every ſpecies of wound, whether accidentally produced, or affected by the hands of a ſurgeon, the firſt circumſtance to be attended to, is the degree of hemorrhagy that takes place. In all ſuch occurrences, the blood is diſcharged, either from one or more large arteries; or, is produced by a general oozing from the ſmaller veſſels over the ſurface of the ſore: To the former of theſe cauſes we ſhall firſt attend, and ſhall afterwards proceed to the conſideration of the latter.

A ſurgeon being called to a perſon loſing much blood from the diviſion of any of the larger veſſels, the firſt ſtep to be taken, is, by means of ſtrong compreſſion, to effect a temporary ſtoppage of the diſcharge, till by the application of ligatures a more effectual remedy is obtained. In the head, as well as in the trunk of the body, the eaſieſt method of applying preſſure of this kind, is, by means of doſſils of lint or of ſoft linen, held firmly upon the mouths of the bleeding veſſels, either by the hands of an aſſiſtant, or by the uſe of a proper bandage: Or, when preſſure can be effectually applied to the ſuperiour part of the artery, it anſwers better; as it not only ſecures the veſſel equally well, but admits of the neceſſary ligature being applied with greater freedom.

When, again, accidents of this nature occur in any of the extremities, and where preſſure can be made with eaſe on the ſuperior parts of arteries, for ſuch caſes we are in poſſeſſion of a remedy, which, when ſkilfully applied, never fails to put an immediate

immediate ſtop to all farther loſs of blood. What is here meant, is, the Tourniquet.

Till the invention of this inſtrument, which was not known before the laſt century, Surgery remained extremely defective indeed. No operation of importance could be undertaken on any of the extremities but with great hazard to the patient; and the effects of large wounds muſt frequently have proved mortal, from the want of this aſſiſtance, which otherwiſe might not have been in any degree hazardous.

As the invention of the tourniquet is claimed by different perſons, and even by different nations, we ſhall not here pretend to ſay from whence it originally came: But whoever had the merit of it, the firſt inſtrument of this kind with which the world was made acquainted, was exceedingly ſimple; ſo much ſo, indeed, that it now appears very ſurpriſing that the diſcovery ſhould have been left for ſuch a late period. A ſmall cuſhion being placed upon the courſe of the principal artery of a limb, a circular rope or bandage was made to paſs twice round it; and a ſmall wooden handle being then introduced between one of the folds of the bandage, for the purpoſe of twiſting it, the cuſhion by theſe means was preſſed with ſo much force upon the artery, as to put an effectual ſtop to the courſe of the blood through the under part of the limb.

Mr. Petit, an eminent ſurgeon of Paris, was the firſt who propoſed a conſiderable improvement on this inſtrument, by connecting the circular bandage with a ſcrew, which was ſo contrived as to produce the preſſure chiefly on the principal arteries, without materially affecting the reſt of the limb. It had this advantage over the other inſtrument, that the operator himſelf could manage it, without being under the neceſſity of employing an aſſiſtant; but it was liable to one great inconvenience from the very circumſtance which by the inventor was

conſidered

Plate III.

Fig. 1.

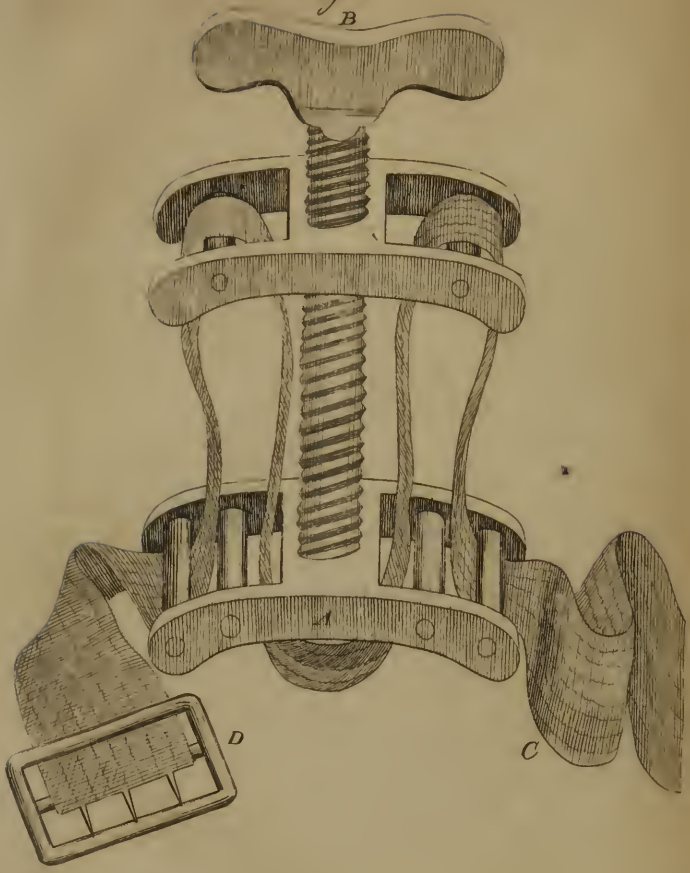
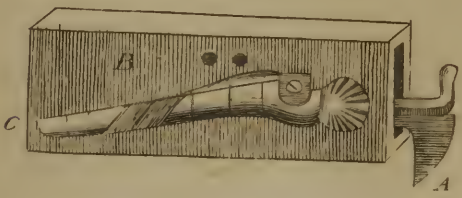


Fig 2.



conſidered as an improvement. This inſtrument of Mr. Petit being made to act upon the principal arteries only, the ſmaller veſſels communicating with theſe, by not being properly compreſſed, diſcharge blood freely from the inſtant they are cut; and as this proves a very troubleſome circumſtance in the courſe of operations, different improvements have of late been made upon it. The pattern in Plate III. is the reſult of all theſe.

By means of this inſtrument in its now improved ſtate, the blood in any limb is very eaſily and effectually commanded; and as it graſps the whole member equally, all the collateral branches as well as the principal arteries are equally compreſſed by it. It has this material advantage, too, over every other inſtrument of this kind, that, when properly applied, a ſingle turn, or even half a turn of the ſcrew, is ſufficient for producing either a flow of blood, or for putting a total ſtop to it.—The manner of uſing it is this.

Let a cuſhion of three inches in length by one inch and half in diameter, be prepared of a linen roller, and be made tolerably firm, but yet not ſo hard as to render the preſſure produced by it very painful: This being placed upon the courſe of the principal artery of the limb, is to be firmly ſecured in that ſituation by one or two turns of a circular roller, of the ſame breadth with the cuſhion itſelf.

The inſtrument A, with the ſtrap connected with it, being now placed upon the limb, with the handle of the ſcrew B on the ſide of the member oppoſite to the cuſhion upon the artery, the ſtrap C is to be carried round the limb directly over the cuſhion, and to be firmly connected on the other ſide to the buckle D. In thus connecting the ſtrap and buckle together, particular attention is neceſſary in doing it with great firmneſs, ſo that the ſcrew may afterwards operate with as much advantage as poſſible, in producing a ſufficient degree of preſſure. When proper attention is paid to this circumſtance,

cumſtance, a ſingle turn of the ſcrew, as we have ſaid, proves ſufficient for putting an entire ſtop to the circulation of blood in the limb: But when the ſtrap has not at firſt been made very tight, ſeveral turns of the ſcrew become neceſſary; an occurrence which may be always eaſily prevented, and which, when not attended to, proves often very embarraſſing in the courſe of an operation.

Whenever it is determined, therefore, that any farther loſs of blood from a divided artery is to be prevented, preſſure on the ſuperior part of the veſſel ought to be immediately applied by the hands of an aſſiſtant, or a proper bandage, when the cut is on the head or trunk of the body; and by means of the tourniquet, when any of the extremities are wounded.

The patient being in this manner ſecured from immediate danger, the practitioner muſt now proceed to the eaſieſt and moſt effectual mode of preventing a return of hemorrhagy on the removal of the tourniquet.

The ancients, as we have ſeen, were ignorant of the uſe and application of the tourniquet, and they were equally deficient in the employment of means for giving a permanent ſecurity againſt the flow of blood from divided veſſels: It will therefore readily occur to every modern practitioner, that in this imperfect ſtate of Chirurgical knowledge, when any capital operations were attempted, they muſt have run a much greater riſk of doing miſchief, than of procuring any advantage to their patients. To the ſmaller veſſels they applied doſſils of linen covered with aſtringent powders; and for the larger arteries, ſearing with hot irons was their only reſource.

Of this laſt remedy, however, although it commands a temporary ſtoppage of the blood in every caſe of hemorrhagy, the effects are by no means to be depended on: For, in general, the pulſation of the larger arteries very ſoon overcomes all

the

the reſiſtance produced by the application of the cautery.

In ancient times, however, when this was the moſt effectual remedy with which the world was acquainted, practitioners were under the neceſſity of having recourſe to it; and, at that period, it is not ſurpriſing to find them exerciſing their genius in inventing a variety of ſtyptic applications: But ſince ſurgery became enriched with that material improvement of ſecuring the larger arteries by means of ligatures, a practice eaſily effected, and with very little pain to the patient, it is ſurpriſing to find that remedies of this kind are ſtill ſearched after. If the uſe of ligatures were in itſelf attended with much difficulty, if by experience it had been found to be productive of many bad conſequences, or, if it had been frequently known to fail in anſwering as a full ſecurity againſt the hemorrhagies of the larger arteries; in any of theſe events, it ought to be the buſineſs of practitioners to endeavour to procure a more effectual remedy. But, as the ligature of arteries is very ſimple in its nature; as the pain ariſing from it is trifling; as few inſtances occur of any thing bad being produced by it; and eſpecially as, when properly performed, it never fails of proving a ſure preventative againſt all loſs of blood from the larger arteries; there can be no good reaſon for anxiouſly ſeeking after other remedies.

Agaric and other fungous ſubſtances have been much extolled for their ſtyptic powers; and chalybeate ſolutions, as well as all the variety of mineral acids, have in different forms been held forth to the publick as effectual remedies of this nature; not only as noſtrums by thoſe of leſs liberal principles, but, what is more ſurpriſing, in ſome inſtances by practitioners of character.

With the former claſs of men this happens as a common occurrence in the courſe of their profeſſion,

and is therefore to be expected; but a perseverance in quest of any new remedy of this kind on the part of Surgeons of reputation, who are already well acquainted with the effects of ligatures in cases of hemorrhagy, and who also know that the practice is seldom attended with bad consequences, must proceed from a degree of nicety and refinement, which may create much trouble to themselves, and which in all probability can never be productive of any practical advantage.

We shall therefore venture to lay it down as an established maxim in surgery, That in every case of hemorrhagy from any of the larger arteries, no styptic application whatever ought to be trusted to, the ligature being the only remedy to be depended on. We now proceed therefore to the consideration of the easiest and most effectual mode of carrying this application into execution.

Various methods have been invented for securing arteries by means of ligatures. The practice now in ordinary use, is, by means of a curved needle, to pass a ligature of sufficient strength round the mouth of the bleeding vessel, including a quarter of an inch all round of the contiguous parts*, and afterwards to form a knot of a proper tightness upon the vessel and other parts comprehended in the noose.

One great objection, however, to this method is, that the nerves accompanying the blood vessels, together with a considerable portion of the muscular substance through which they pass, must always be surrounded with every ligature formed in this manner. From this circumstance much more pain is produced than is necessary, by the nerves and other parts being at the same time compressed with the arteries; and, on some occasions, the same cause has evidently given rise to violent convulsive affections,

* Sharp's Surgery—On Amputation.

affections, not only of the part chiefly affected, but of the whole ſyſtem.

Spaſmodic twitches are frequently found to occur after the amputation of limbs, and are often the ſource of much diſtreſs. In ſome inſtances they are no doubt to be conſidered as the effect of other cauſes; but in various caſes it has happened, that demonſtrative proof has been obtained of their ariſing from the ligatures of arteries applied in an improper manner. When ſuch convulſive affections occur after amputations, and the uſual means of preventing them are found to fail, effectual relief may be frequently obtained by deſtroying the ligatures altogether, ſo as to remove the compreſſion upon the nerves; care being taken at the ſame time to renew the ligatures upon the arteries immediately, without comprehending any of the contiguous parts.

Thus, it is not to the ſimple ligature of veſſels, but to the improper manner in which the operation is performed, that is, the including of nerves and other parts, inſtead of tying the arteries alone, that the bad ſymptoms occurring in ſuch caſes are to be attributed.

Practitioners have commonly been afraid of tying up blood veſſels by themſelves without the intervention of ſome of the ſurrounding parts, on this ſuppoſition, that the coats of arteries are not of ſufficient firmneſs to bear that degree of compreſſion neceſſary for the prevention of hemorrhagy.

This, however, originates from an idea that the coats of arteries are not ſo ſtrong as they really are; and that a great degree of force is neceſſary for compreſſing their ſides into cloſe contact with one another.

But it is now well known, that even very ſmall arteries are poſſeſſed of much firmneſs; and it is alſo certain, that even in the largeſt arteries of the arm or thigh,

thigh, a very ſlight degree of compreſſion is fully ſufficient, not only for reſtraining hemorrhagy, but for ſecuring the ligature on the very ſpot to which it is firſt applied: And in ſmall veſſels the force neceſſary for this purpoſe is trifling indeed; being far leſs than is commonly applied.

Although the circumſtance we are now inſiſting upon may not at firſt ſight ſeem to be of much importance, yet in fact it merits very particular attention. Even of itſelf it is a matter of no ſmall conſequence, but it is the more material when we conſider it as connected in many inſtances with circumſtances on which the life of a patient may in a great meaſure depend; and we know well too, that ſucceſs in ſurgical operations depends more on a minute attention to every circumſtance relating to them, than on particular dexterity in any one part of them.

It has alſo been objected to this mode of ſecuring blood veſſels by themſelves, that the ligatures, although they ſhould not cut the arteries through, yet that they are more apt to ſlip than when ſome of the ſurrounding parts are comprehended along with them; and, in ſome inſtances, it is ſaid that arteries retract ſo far, that they cannot in any other way be laid hold of, than by means of the crooked needle in the ordinary method.

Long and repeated experience, however, of a few individuals, in regard to this mode of taking up arteries by themſelves, has put the fact beyond a doubt, that it is as ſecure as any other yet invented*. —Fatal hemorrhagies after capital operations, either from inattention, or ſome other cauſe, do now and then indeed happen in the hands of the moſt able practitioners; but occurrences of this nature have as frequently happened when the curved needle was employed, as when the blood veſſels were ſecured

* See an eſſay upon this ſubject, by the ingenious Mr. Aitken, ſurgeon in Warrington.

ed by themſelves without any of the contiguous parts being included.

From the reſult of my own experience, indeed, I ſhould be induced even from this conſideration, to draw a concluſion in favour of the method we have been endeavouring to recommend. For, in the courſe of practice, both among hoſpital patients and in private, I have known different deaths occur from the bleeding of ſtumps after the amputation of members: Whether this proceeded from the ligatures having ſlipped from ſome of the arteries; or from this circumſtance, that ſome of the veſſels which did not appear during the operation, had been of courſe paſſed over without being obſerved and had afterwards burſt out, I ſhall not pretend to determine: But in all of theſe, *the crooked needle only* had been uſed during the operation; and it has ſo happened, that I never met with a ſingle inſtance of a ſimilar occurrence where the arteries were ſecured by themſelves by means of the tenaculum; an inſtrument to be afterwards taken notice of.

In a few inſtances it may happen, that a bleeding veſſel, from lying at the bottom of a deep wound, cannot be laid hold of in any other manner than by the curved needle being made to paſs round it. Such occurrences, however, are exceedingly rare: Inſomuch that I have ſeldom known an inſtance in which hemorrhagy could not be as effectually reſtrained by the mode now to be pointed out, as by the uſe of the crooked needle.

In all operations whatever, to ſave unneceſſary pain ought to be a very capital object. In every buſineſs of this kind, the object in view ought no doubt to be attained in the moſt complete manner; but that mode of operation, which is as complete as any other, at the ſame time that it is the leaſt painful to the patient, is undoubtedly in every inſtance to be preferred. Now, with reſpect to the point in queſtion, as we have already clearly ſhown, that arteries

teries may be tied with as much ſafety in every reſpect, by themſelves, as when connected with any of the neighbouring parts, the difference of pain produced by the two modes of operating, ought at once to determine in favour of the former.

When any of the contiguous parts, particularly when the nerves which generally accompany the bloodveſſels, are included in the ſame ligature with an artery, which when the curved needle is employed is a circumſtance ſcarcely to be avoided, every practitioner knows that tying the knot in this manner is frequently complained of by the patient in very ſevere terms. I have on many occaſions known patients who have borne the amputation of limbs, and of cancerous breaſts, without ſhrinking, complain bitterly of the ſevere pain produced by the method of ſecuring arteries with the crooked needle. And on the contrary, the pain attending the method now propoſed, is ſo trifling, that, when properly done, even the moſt timid patients very ſeldom complain of it.

For ſome time after I firſt began to uſe the tenaculum, curioſity induced me, on different occaſions, to put the matter under conſideration to the teſt of experiment: And to render the trial as fair and deciſive as poſſible, it was always made upon the ſame ſubject, under the ſame operation. Different veſſels were ſecured in the ordinary manner by the crooked needle; whilſt others were laid hold of by the tenaculum: But ſo great was the difference in point of pain, that the one was uniformly allowed to give very little uneaſineſs: Whereas it frequently happened, that the other was complained of as the moſt painful part of the whole operation.

Among other advantages which the tying of arteries by means of the tenaculum has over the old mode of operating, there is ſtill one we have not yet taken notice of. It often happens after amputations, and other operations where the larger

arteries

arteries have been tied, that the ligatures do not come eaſily away, from being made to run ſo deep as with the curved needle is commonly neceſſary. In ſome inſtances much pain and trouble has occurred from this circumſtance, the ligature remaining quite immoveable for a great many weeks: And after all, I have ſeen it neceſſary for the ſurgeon, to put the patient to a great deal of pain, by being obliged to cut out the threads with a ſcalpel. But when the tenaculum is uſed, every riſk of this kind is avoided, from the ligatures generally dropping of their own accord, in the courſe of the third or fourth dreſſing of the ſore.

From what has been ſaid, therefore, we ſhall conſider it as a practice that ought to be eſtabliſhed, that in forming the ligature of arteries, the nerves and other contiguous parts ſhould be carefully avoided.

For the purpoſe of effecting this with eaſe and ſafety, various kinds of the inſtrument termed a Forceps have been invented; with theſe, the arteries of a ſore are laid hold of and pulled out, ſo as to admit of the application of ligatures.

For the larger blood veſſels, the forceps has been found to anſwer conveniently enough; but, in the ſmaller arteries, they are by no means ſo fit for the purpoſe as the inſtrument or hook I have been recommending, termed a Tenaculum, and repreſented in Plate I. And as a hook of this form anſwers equally well in the larger arteries likewiſe, the uſe of the forceps may therefore be laid entirely aſide. The manner of uſing the tenaculum is this.

In order to detect the arteries to be tied, the tourniquet with which they are ſecured, muſt be ſlackened a little by a turn or two of the ſcrew; and the moment the largeſt artery of the ſore is diſcovered, the ſurgeon fixes his eye upon it, and immediately reſtrains the blood again by means of the tourniquet. An aſſiſtant now forms a nooſe on the ligature

ligature to be made uſe of ; and this nooſe being placed immediately over the end of the artery, ſo as to include it with certainty, the operator then puſhes the ſharp point of the tenaculum through the ſides of the veſſel, and at the ſame time pulls ſo much of it out, over the ſurface of the ſurrounding parts, as he thinks is ſufficient to be included in the knot which the aſſiſtant is now to make. In forming this ligature, the ſurgeon's knot, as it is termed, which conſiſts in paſſing the thread twice through the firſt nooſe is certainly preferable to every other, from its being leſs liable to yield or ſlip. And as ſome additional ſecurity is obtained by forming a ſecond knot above the firſt, this precaution ought never to be omitted. It is eaſily done ; and on ſecurity in this point the patient's life may in a great meaſure depend.

The degree of ſtrength of the ligature muſt always be proportioned to the ſize of the veſſels ; but this is a circumſtance to be at all times determined by the judgment of the practitioner, as muſt alſo the force to be employed in forming the knots. To what was already ſaid upon this point I ſhall juſt add, that a very ſmall force is fully ſufficient for ſecuring even the largeſt arteries : And that, after ſuch a force has been applied as evidently reſtrains the farther loſs of blood, a very trifling additional compreſſion is all that is neceſſary.

The principal artery being in this manner ſecured, all the veſſels of the part muſt one after another be taken up in the ſame manner, by firſt looſening the tourniquet in order to diſcover them, and afterwards applying the ligature to each in the manner directed.

It often happens, however, that the loſs of blood the patient has ſuſtained ; a tendency to delinquium which may take place for the time ; the fear he labours under ; and the degree of cold to which the ſore is expoſed, have altogether ſuch an effect upon the

the ſmaller arteries, as to prevent them for the time from diſcharging their contents; and as arteries left in ſuch a ſtate without being ſecured, generally burſt out on the removal of theſe cauſes, a circumſtance which always occaſions much trouble to the practitioner, as well as a great deal of pain and riſk to the patient, every ſurgeon ought to pay the niceſt attention to this point.

The tourniquet ſhould be made perfectly looſe; any coagulated blood on the ſurface of the ſore ought to be carefully waſhed off with a ſponge and warm water; and the patient, if faintiſh, ought to get a glaſs of wine, or ſome other cordial; and after all, the ſurgeon ought to examine, with the moſt minute attention, the uſual courſe which the veſſels of the part are known to take.

This being done, every artery of the part, even the ſmalleſt that can be diſtinguiſhed, ought to be ſecured with a ligature: For ſuch veſſels as appear exceedingly trifling while the part is yet expoſed to the air, nay even the ſmall branches of arteries that happen to be neglected, will be capable of diſcharging very conſiderable quantities of blood after the patient becomes warm in bed, when the ſolids are thereby relaxed and the fluids expanded; and, as little or no injury can ever be done by the proper application of ligatures to all the arteries that preſent themſelves, the greateſt attention ought at all times to be paid to this circumſtance.

I have inſiſted the more on this, from having frequently obſerved much uneaſineſs and diſtreſs produced by a want of proper attention to this part of an operation.

When the principal arteries of a ſtump have been taken up, and a little blood continues to be diſcharged, but appears to come from a few ſmall veſſels only, the ſurgeon, unleſs he is much accuſtomed to occurrences of this nature, is induced to think, that as they are very trifling to appearance, ſo he need

not be at the trouble of tying them, as the neceſſary compreſſion of the bandages proper for the wound will in all probability effect a total ſtoppage of the hemorrhagy. In a general oozing of a ſmall quantity of blood from the whole ſurface of a ſore, and when no particular veſſel can be diſtinguiſhed, there is a neceſſity for truſting to this remedy; but, whenever an artery can be diſcovered, of whatever ſize it may be, it ought unqueſtionably to be ſecured by a ligature. It very rarely happens that any inconvenience occurs from ligatures when properly applied; but many lives have been loſt from a remiſſneſs in this article. I have known different inſtances of this, and the ſame muſt have occurred to others.

When, from the deepneſs of a wound, or from any other cauſe, ſome particular artery cannot be properly ſecured by the tenaculum; in this caſe we are under the neceſſity of employing the crooked needle, and the following is the mode of uſing it.

The operator ought to be provided with needles of various ſizes, and of different forms. The needles in ordinary uſe, are for many purpoſes quite too much crooked; for, in general, they are more eaſily managed when their curvatures are not ſo conſiderable.

The ſame kinds of needles that are found neceſſary for the interrupted ſuture, as repreſented in Plate I, anſwer equally well for the ligature of arteries.

The needles in common uſe are made triangular with three edges, one on each ſide, and a third on the concave part of the needle. There is no real neceſſity, however, for more than two: Indeed the needle enters more eaſily with two than with three edges; and as the third edge on the concave ſide, renders them more liable to injure arteries and other parts in the courſe of their introduction, this addition ought to be omitted.

A needle of this ſhape, armed with a ligature of a ſize proportioned to itſelf and to the veſſel to be taken

taken up, is to be introduced at the diſtance of a ſixth or eighth part of an inch from the artery, and puſhed to a depth ſufficient for retaining it, at the ſame time that it is carried fully one half round the blood veſſel. It muſt now be drawn out; and being again puſhed forward till it has completely encircled the mouth of the artery, it is then to be pulled out, and a knot to be tied of a ſufficient firmneſs, as was already directed when the tenaculum is uſed.

In this manner, either by the uſe of the crooked needle, or of the tenaculum, every hemorrhagy depending upon a diviſion of one or more large arteries, may in general be very eaſily reſtrained; but it frequently happens, that conſiderable quantities of blood are diſcharged, not from any particular veſſel, but from all the ſmall arteries over the ſurface of the ſore. In wounds of great extent, particularly after the extirpation of cancerous breaſts, and in other operations where extenſive ſores are left, this ſpecies of hemorrhagy often proves very troubleſome from being exceedingly difficult to ſuppreſs.

Bleedings of this kind ſeem evidently to proceed from two very different and oppoſite cauſes; a circumſtance which, in the treatment of them, is a matter requiring very particular attention.

First, We now and then find effuſions of this nature occurring in ſtrong robuſt people, where they evidently proceed, either from too great a quantity of blood contained in the veſſels, or from an exceſs of tone in the veſſels themſelves; or, perhaps, from a combination of both theſe cauſes. But, Secondly, Such evacuations undoubtedly happen moſt frequently in conſtitutions quite the reverſe of the former, viz. in ſuch as are very relaxed and debilitated; either from a putrid diſſolved ſtate of the blood, or from a want of tone in the containing veſſels, or in ſome inſtances from a concurrence of both.

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In conſtitutions perfectly healthy, when the fluids are not tainted with any degree of putreſcency, and the ſolids are poſſeſſed of their natural tonic powers, on the occurrence of wounds even of the moſt extenſive nature, as ſoon as the larger arteries are ſecured, all the ſmall veſſels that have been divided, in conſequence of that contractile power with which in a ſtate of health they are endowed, and from the ſtimulus of the external air to which they are now expoſed, are diminiſhed not only in their diameters, but alſo in their length; in conſequence of which, they recede conſiderably within the ſurface of the ſurrounding parts.

This cauſe of itſelf would probably in the greateſt number of inſtances prove ſufficient for reſtraining all loſs of blood from the ſmaller arteries; but in the ſound ſtate of conſtitution of which we have now been ſpeaking, another very powerful agent is provided by nature for producing the ſame effect. From the extremities of the divided veſſels which at firſt diſcharged red blood only, there now, in their contracted ſtate, oozes out a more thin, though viſcid fluid, containing a certain proportion of the coagulable parts of the blood; and this being equally diſtributed over the ſurface of the wound, by its balſamic agglutinating powers, has undoubtedly a very conſiderable influence in reſtraining all ſuch hemorrhagies.

In conſtitutions altogether healthy, where neither of the ſtates of diſeaſe we have alluded to preponderates over the other, we find, that, as ſoon as the larger arteries of wounds are ſecured, nature, in the manner already deſcribed, generally puts a ſtop to all farther diſcharge. So that, whenever the contrary happens, by a tedious oozing continuing from the ſurface of the ſore, we ought then to pay particular attention to the habit of body with which it is connected.

When ſuch an occurrence happens in a patient, young and vigorous, and where the tone of the muſcular

cular fibres is evidently great, the moſt effectual means of putting a ſtop to the diſcharge, is to relax the vaſcular ſyſtem, either by opening a vein in ſome other part, or, what gives ſtill more immediate relief, by untying the ligature on one of the principal arteries of the part, ſo as to allow it to bleed freely: Thoſe violent ſpaſmodic twitchings too, ſo frequent after operations on any of the extremities, when they do not depend on a nerve being included in the ligature with the artery, are in this manner more effectually relieved than by any other means.

By the ſame means, the patient, from being in a febrile heat and much confuſed, ſoon becomes very tranquil: The violent pulſation of the heart and larger arteries abates, and the blood not being propelled with ſuch impetuoſity into the ſmaller veſſels of the part, they are thereby left at more liberty to retract; and as in this ſtate they do not pour forth red blood ſo freely, they are the more readily covered with that viſcid glutinous fluid which we have already ſhown to be one of the moſt important means intended by nature for the prevention of ſuch hemorrhagies. At the ſame time that by the means recommended we endeavour to allay the commotion produced in the ſyſtem, the patient ought to be kept exceedingly cool; wine and other cordials ſhould be rigidly avoided; cold water, acidulated either with the mineral or vegetable acids, ought to be the only drink; motion of every kind, particularly of the part affected, ſhould be guarded againſt; and the wound being gently covered with lint or ſoft charpie, ought to be tied up with a bandage ſo applied as to produce a moderate degree of preſſure on the extremities of the divided parts.

In every extenſive wound attended with hemorrhagies of this kind, and particularly when violent ſpaſmodic affections of the muſcles ſupervene together with the means already recommended, large doſes of opiates are found highly beneficial; for whatever

whatever hurtful effects may have been apprehended from opiates in some inflammatory affections, every practitioner who has ventured on a free use of them must admit, that in all occurrences of this nature their influence far surpasses that of any other remedy.

As soon therefore as a sufficient quantity of blood has been discharged, and the wound is dressed and the patient laid to rest, a dose of opium proportioned to the violence of the symptoms ought to be exhibited. It should be remarked, however, that, in all such circumstances, much larger doses of the remedy are necessary, than in ordinary cases requiring the use of opiates. Small doses, instead of answering any good purpose, seem frequently rather to aggravate the various symptoms; so that, whenever they are here employed, they ought always to be given in quantities sufficient for the intended effect.

Although hemorrhagies of this nature do now and then occur in firm vigorous constitutions; yet they undoubtedly happen much more frequently in relaxed enfeebled habits, where the solids have lost part of their natural firmness, and the fluids have acquired some degree of putrescency. As the vessels in this situation are supposed to have been deprived of that degree of tone of which we wish them to be possessed, instead of restraining the patient from the use of cordials, as is done usually in every case of hemorrhagy, a moderate use of generous wine ought to be immediately prescribed; for nothing, it may be observed, tends so much in such circumstances to restrain hemorrhagies, as a well directed use of proper cordials. By intending to invigorate and brace the solids, they thereby enable the arterial system to give a due resistance to the contained fluids; and the same cause, it may be observed, has a considerable influence in restoring to the fluids

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that viſcidity of which in all ſuch inſtances we ſuppoſe them to be deprived.

Whenever, therefore, ſuch tedious hemorrhagies occur in relaxed debilitated habits, a free uſe of Port, Madeira, or any other wine whoſe ſtrength and goodneſs can be depended on, ought to be immediately allowed; a nouriſhing diet alſo becomes proper; the patient ought to be kept cool; and the mineral acids, from their known utility in every ſpecies of hemorrhagy, ought alſo to be preſcribed. Reſt of body is here proper too; and opiates, when indicated either by pain or ſpaſmodic affections of the muſcles, ought never to be omitted.

Together with theſe remedies adapted to the general ſyſtem, particular dreſſings, appropriated to the ſtate of the parts to which they are to be applied, have been found very beneficial. We have already remarked, that in firm healthy conſtitutions, as ſoon as the diſcharge of blood which naturally occurs in every large wound is over, the parts come ſoon to be covered with a viſcid coagulable effuſion from the mouths of the now retracted arteries; but in conſtitutions of an oppoſite nature, where the ſolids are much relaxed, the blood in general is found in ſuch a diſſolved ſtate as to afford no ſecretion of this nature.

In order therefore to ſupply as much as poſſible the deficiency of this natural balſam, different artificial applications have been invented. Duſting the parts with ſtarch or wheat flour has ſometimes been found of uſe; and I have known gum arabic in fine powder to anſwer when theſe have failed.

Applications of this kind, indeed, have been uſed with ſucceſs in all ſuch hemorrhagies, with whatever habit of body they happen to be connected; but they have always proved more particularly ſerviceable in relaxed conſtitutions, attended with a diſſolved ſtate of the blood and an enfeebled muſcular ſyſtem. We may here uſe with freedom too, a

remedy

remedy which in such circumstances generally proves serviceable, but which in constitutions of an opposite nature ought never to be employed. The remedy alluded to is alcohol, or any other ardent spirits, impregnated with as great a quantity as they can dissolve of myrrh or any other of the heating viscid gums. The balsamum traumaticum of the shops, a remedy of this nature, has long been famous for its influence in such cases: But that indiscriminate use of this and similar applications which has long prevailed with some practitioners, I am confident has done much harm; for, as they are all possessed of very stimulating powers, they of course tend to aggravate every symptom in wounds connected with a tense state of fibres, when much pain, and especially when spasmodic muscular affections, prevail. But, in constitutions of an opposite nature, where the blood appears to be in a dissolved state, and where the arterial system seems evidently to require a stimulus, remedies of this class come to be very useful: Insomuch that, in every constitution of this kind where hemorrhagies prove troublesome, no application whatever is found to answer better, than charpie immersed in an agglutinating spirituous balsam of this nature.

By a due perseverance in one or other of the plans here pointed out, it will seldom happen that hemorrhagies of this nature are not at last restrained: But when the contrary does occur; when, notwithstanding the use of the remedies recommended, a discharge of blood still continues; together with the means already advised, an equal moderate pressure ought to be applied over the whole surface of the sore, to be continued as long as the necessity of the case seems to indicate.

In finishing the dressings of such wounds, after the charpie and compresses have been applied, a bandage ought to be adapted to the part in such a manner as to produce as equal a degree of pressure

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over the ſurface of the ſore as poſſible. But it ſometimes happens, that no bandage whatever can be ſo applied as to produce the deſired effect; and in ſuch caſes, the hand of an aſſiſtant is the only reſource. In ſuch inſtances, a perſon's hand being firmly applied over the dreſſings, ſo as to produce a very equal degree of preſſure, will commonly ſucceed when no other remedy is found to have much influence.

Having thus endeavoured to point out the moſt effectual means of putting a ſtop to morbid hemorrhagies, we ſhall now proceed to conſider the different modes employed by art, for effecting a diſcharge of blood when indicated by the preſence of ſome diſorder in the conſtitution.

CHAP. III.

OF BLOODLETTING.

SECTION I.

Of BLOODLETTING *in* GENERAL.

BLOODLETTING, whether we conſider it as to its influence on the ſyſtem, or with reſpect to the niceneſs and even difficulty of the mode uſually employed for effecting it, is perhaps one of the moſt important operations in ſurgery. From its being ſo frequently put in practice, and from every pretender to any knowledge in the healing art being able to perform it without any apparent difficulty, the publick have been induced to conſider it as trivial with reſpect to its execution; but every practitioner of character muſt acknowledge, that, in order to perform this operation properly, the greateſt nicety, ſteadineſs, and exactneſs, are neceſſary. All the other operations in ſurgery I have frequently ſeen well performed; but I can with freedom ſay, that I have ſeldom ſeen bloodletting with the lancet done very correctly: When properly performed, it is really a neat operation; but when not done with exactneſs, it is the very reverſe.

It is not here meant to enter into the conſideration of the various cauſes which in different circumſtances point out the propriety of abſtracting blood from the ſyſtem; nor is it intended to enter upon a particular diſcuſſion of the different effects produced by general and topical bloodletting: Theſe conſiderations, as being highly important, would of themſelves

themſelves extend to a very great length ; and beſides, are of ſuch a nature as renders it impoſſible to enter minutely upon their diſcuſſion in any ſyſtem of ſurgery. All that is here intended, is to deſcribe as clearly as poſſible the various modes of performing the operation of bloodletting.

In all inflammatory affections producing a general diſorder of the ſyſtem, the method of taking away blood as now eſtabliſhed by immemorial practice, is, by ſuch means as diſcharge the quantity to be taken in a ſhort ſpace of time, by an opening made with a lancet, either in an artery or in a vein. Whether there is any real difference in the effects produced by theſe two modes of diſcharging blood, it may be difficult to determine with any preciſion ; but there is reaſon to ſuppoſe, that, independent of the quantity taken, the difference is of leſs importance than is commonly imagined. The latter of theſe termed Phlebotomy, and the former Arteriotomy, are the means employed for what we term *general* bloodletting ; the particular conſideration of which we ſhall preſently attend to.

But it often happens, in diſorders of an inflammatory nature, where there is evidently a fixed local affection, and where no great degree of fever takes place, that general bloodletting has not much influence in mitigating the ſymptoms ; and in ſuch circumſtances conſiderable advantage is frequently obtained by diſcharging blood from the part immediately affected, by dividing a number of the ſmall veſſels which ſupply it ; and this we term *Topical* or *Local* bloodletting. The means employed by art for diſcharging blood in this manner ſhall be afterwards treated of, and we now return to the particular conſideration of phlebotomy.

Wherever a vein of a tolerable ſize can be reached with ſafety, an opening for the diſcharge of blood may be made in it with a lancet ; but the following are the parts from whence blood is uſually taken

en in this manner ; viz. from the veins of the arm at the flexure of the cubitus ; from the jugular veins ; and from the veins of the ankles and feet. On particular occaſions, too, blood is adviſed to be taken from the veins of the hand, of the tongue, &c.

There are ſome general rules and obſervations which relate equally to this operation in whatever part of the body it is practiſed ; theſe we ſhall in the firſt place point out with as much accuracy as poſſible, and ſhall afterwards proceed to treat particularly of bloodletting in the arm and other parts.

I. In this as in every other operation, the ſituation of the patient, and of the operator likewiſe, ought to be preciſely fixed. As the ſituation of a patient during the operation of bloodletting, has a conſiderable influence on the effects produced by the evacuation upon the ſyſtem, this circumſtance therefore merits our particular attention. In ſome diſorders, it is the object of this remedy, to evacuate a conſiderable quantity of blood without inducing fainting : When this is the caſe, and when from former experience it is known that the patient to be operated upon is liable during the evacuation to fall into a faintiſh ſtate, a horizontal poſture, either upon a bed or on a couch, ought to be preferred to every other ; for every practitioner is now well acquainted with this fact, that fainting does not ſo readily occur in a horizontal as in an erect poſture.

It now and then happens, however, that one material advantage expected from the operation of bloodletting, is the inducing a ſtate of deliquium ; as for inſtance, in caſes of ſtrangulated hernia, where a general relaxation of the ſyſtem is ſometimes deſirable. In all ſuch circumſtances, inſtead of a horizontal poſture, the more erect the patient is kept, the more readily will a ſtate of fainting be induced : So that the particular object in view from the operation, muſt at all times determine this matter.

While we thus attend particularly to the poſture of

of the body at large, the particular position of the limb or part to be operated upon must not be neglected. In every operation, it is a matter of much importance to have the patient seated in a proper light, but in none is it more material than in bloodletting. The best general rule that can be given upon this point is, that the patient ought to be so placed, as that the principal light of the apartment shall fall directly upon the part to be operated upon, so that the vein to be opened may be made as apparent as possible. When clear day light can be obtained, it ought to be preferred; but when this cannot be procured, one or more candles should be used.

But, whatever may be the position of the part itself, and whether the patient is to be placed on a bed or on a chair, the surgeon ought always to be seated. The operation may, no doubt, be done while the surgeon is standing; and it is most frequently indeed performed in this manner: But it can never be done either with such steadiness or neatness, as when the operator is firmly seated on a chair.

II. From the coats of veins being more flaccid than those of arteries, and from the blood not circulating with such rapidity in the former as in the latter, an opening made in one of these will seldom discharge blood freely, unless the vein be either cut entirely across, which in general would be productive of disagreeable consequences, or unless the blood be prevented from returning to the heart, by means of a ligature placed between the heart and that part of the vein in which the opening is to be made.

The patient being properly seated, the next step must therefore be, by means of a proper bandage so to compress the vein intended to be opened, as to prevent the blood from returning to the heart; and for the same reason, an equal degree of pressure, it

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is obvious, ought to be applied to all the other veins of the part; for, if this circumſtance ſhould not be attended to, the communication preſerved by the collateral correſponding branches would render the preſſure upon any one particular vein of very little importance. But, independently of its producing a more free diſcharge of blood than could be otherwiſe obtained, this preſſure upon the veins, by cauſing an accumulation of their contents, tends to bring them more evidently into view, and conſequently renders it eaſier for the operator to affect a proper opening than he would otherwiſe find it.

Although compreſſion, however, to a certain extent, is neceſſary for this purpoſe of accumulating a quantity of blood in the veins, and for afterwards diſcharging it at an opening made by the lancet, it is at the ſame time perfectly evident that any conſiderable degree of preſſure, inſtead of forwarding theſe purpoſes, muſt obſtruct them entirely; for, if the preſſure intended to be applied to the veins only, ſhould accidentally be carried ſo far as to reſt materially upon the arteries connected with them, all farther acceſs of blood to the veins would be thereby cut off, ſo that no evacuation of importance could take place at any opening to be made in them. Whenever it is intended, therefore, to evacuate blood in this manner, a good deal of nicety is requiſite in applying this preſſure upon the veins: It ought always to be carried ſo far as effectually to compreſs the veins of the part, but never to ſuch a length as to obſtruct the circulation in the correſponding arteries. When we ſee that the preſſure has the effect of raiſing the veins, and if at the ſame time the pulſation of the artery is diſtinctly felt in the inferiour part of the member, we may then be certain that it is applied to a very proper degree, and that it ought not to be carried farther: For by the ſwelling of the veins, we are ſure that they are ſufficiently compreſſed; and by the arteries continuing to beat, it is evident

ident that a continued flow of blood may be expected.

III. The reflux of blood to the heart being in this manner prevented, the next point to be determined, is, the beſt method of making an opening into the vein. Different inſtruments have been invented for this purpoſe; but there are two only which have been retained in uſe, and which are all, therefore, that here require to be mentioned. Theſe are, the Lancet and the Phleme. This laſt, on being placed immediately on the part to be cut, is by means of a ſpring ſtruck ſuddenly into the vein, and produces an opening of the exact ſize of the inſtrument employed.

The phleme, in many parts of Germany, has acquired ſome reputation, particularly in taking blood from the jugular vein: But there are various objections to this inſtrument, which will probably prevent it from ever coming into general uſe; and theſe particularly are, that we are obliged, from the nature of the inſtrument, to regulate the deepneſs to which it is to go, before it is applied: Now we know well, that in bloodletting this is a circumſtance of which we are never by any means certain; for we frequently, after the introduction of a lancet, find it neceſſary to go much deeper than was at firſt expected; ſo that when a phleme is uſed, unleſs we employ one on every occaſion of a length which cannot be frequently required, we muſt often meet with diſappointments.

But the moſt material objection to this inſtrument is, that where there are arteries or other parts lying below the veins, and in any danger of being hurt by the operation of bloodletting, the riſk is much greater with the phleme than with the lancet: For when the lancet is uſed, after the vein is once opened, the orifice may be enlarged at pleaſure without any additional riſk, merely by carrying the inſtrument forward along the courſe of the vein at the

the ſame depth to which it was at firſt introduced; whereas the phleme, as ſoon as it enters the vein, muſt for certain paſs directly downwards as far as its length will permit it to go; a circumſtance which adds greatly to the riſk of wounding the parts underneath.

Independently of this too, by the uſe of the lancet, we have it much more in our power to command an orifice of a determined ſize than when the phleme is uſed: So that without heſitation, we may venture to pronounce the phleme to be an inſtrument in no degree neceſſary; but for ſuch as incline to uſe it, the moſt convenient form of one is repreſented in Plate III, fig. 2.

The manner of uſing the phleme is as follows. The bandage for producing the turgeſcency of the veins being applied in the manner already directed, the point of the inſtrument *A*, with the ſpring properly bent, muſt be ſo placed upon the part of the vein to be opened, that an orifice of an oblique direction may be made in it on the ſpring *B* being let looſe. The ſubſequent management is the ſame here as when the lancet is uſed, and will be preſently pointed out.

When it is determined to employ the lancet, the form of the inſtrument is evidently the firſt circumſtance requiring our attention; although we may here remark, that this point is ſeldom ſo particularly attended to as it ought to be.

The form of the lancet in ordinary uſe, as repreſented in Plate IV, fig. 5. is an inſtrument which ought to be laid entirely aſide. For opening abſceſſes it is very well calculated, but for the operation of bloodletting it ought never to be uſed.

The capital objection to this form of lancet, is, that the broadneſs of its ſhoulders produces always a wound in the external teguments of perhaps three times the ſize of the opening made in the vein; a circumſtance which adds no advantage whatever to the

Plate IV.

Fig. 1

Fig. 2

Fig. 3.

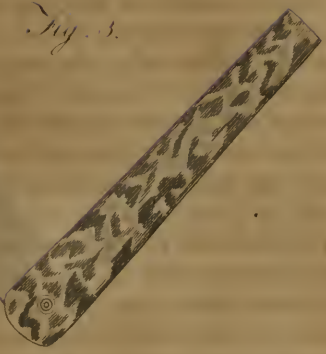


Fig. 4

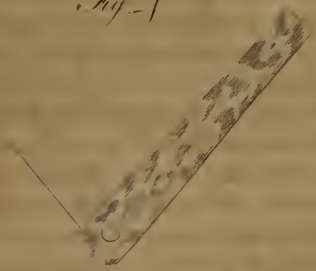
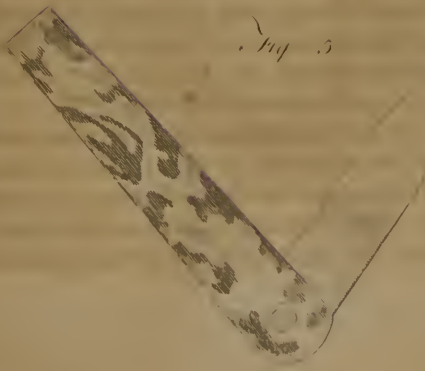


Fig. 5



the operation: On the contrary, it produces much unneceſſary pain in the firſt inſtance; it renders it frequently a very difficult matter to command a ſtoppage of the blood; and the wounds produced by it are commonly ſo extenſive as to render them very liable to terminate in partial ſuppurations; an occurrence which always proves painful and diſagreeable to the patient.

The ſpearpointed lancet, on the contrary, as repreſented in Plate IV, fig. 3 and 4, is an inſtrument in every reſpect well calculated for the purpoſe of venæſection. From the acuteneſs of its point, it enters the teguments and vein with very little pain; which we may here obſerve, is with many patients a circumſtance of no ſmall importance: We are ſure of making the opening in the vein equal, or nearly ſo, to the orifice in the external teguments: And the diſcharge of blood produced by an opening made with one of the lancets, is commonly put a ſtop to with great eaſe, immediately on removing the ligature upon the vein.

For theſe reaſons, therefore, the ſpearpointed lancet is highly preferable to every other: And although, with timid practitioners, the acute point of this inſtrument may appear to require more dexterity in uſing it than the broad ſhouldered lancet; yet the difference in this reſpect is ſo inconſiderable, that very little experience muſt, with every practitioner who gives it a fair trial, very ſoon counterbalance all ſuch objections. Indeed no ſurgeon ought to be truſted in letting blood with the one, whoſe ſteadineſs and dexterity would be in any degree doubted with the other.

IV. The form of lancet being thus fixed upon, we come now to ſpeak of the method of uſing it. The ſurgeon and patient being both properly ſeated, and the ligature having been applied for a ſhort ſpace of time in order to produce ſome degree of ſwelling in the veins, that vein is to be made choice of, which,

at the ſame time that it appears conſpicuouſly enough, is found to roll leſs than the others on being preſſed upon by the fingers. There are ſome veins which roll ſo much, from being looſe and unconnected with the cellular ſubſtance of the part, that although they may riſe ſufficiently, yet are much worſe to operate upon than others which lie at a much greater depth. That vein therefore is to be preferred which not only riſes ſo as to become perfectly evident, but which appears to be connected with ſome degree of firmneſs to the contiguous parts. It is ſcarcely thought neceſſary to obſerve here, that when a vein appears to be ſo immediately connected with a contiguous artery or tendon, as evidently to produce ſome riſk of wounding theſe parts in the operation, if another vein not liable to ſuch hazard can be procured, it ought undoubtedly to be preferred.

Veins may lie directly above both arteries and tendons, and yet no manner of riſk be incurred by opening them, provided the operator is ſufficiently ſteady and attentive; but it does now and then happen, that veins are ſo nearly and intimately connected with theſe parts, as to render it hazardous even for the moſt dexterous ſurgeon to attempt this operation.

The vein being at laſt made choice of, the ſurgeon, if he is to uſe his right hand in the operation, takes a firm hold of the member from whence the blood is to be drawn, with his left, and, with the thumb of the ſame hand, he is now to make ſuch a degree of preſſure upon the vein, about an inch and half below the ligature, as not only to render the ſkin and teguments ſomewhat tenſe, but at the ſame time to interrupt for a little all communication between the under part of the vein, and that portion of it lying between the ligature and the thumb placed as thus directed.

The

The lancet being bent to ſomewhat more than right angles, the operator now takes it between the finger and thumb of his right hand; and, leaving at leaſt one half of the blade uncovered, he reſts his hand on the middle finger, ring finger, and little finger, all placed as conveniently as poſſible in the neighbourhood of the vein from whence the blood is to be taken; and having puſhed the point of the inſtrument freely through the ſkin and teguments into the vein, he now carries it forward in an oblique direction, till the orifice is of the ſize he inclines to have it; taking care, during the time of puſhing on the lancet, that its point be kept in as ſtraight a direction as poſſible, for fear of dipping into the parts below.

The inſtrument is now to be withdrawn, and the ſurgeon removing the thumb of his left hand, is to allow the vein to empty itſelf freely into the cups provided for the purpoſe.

It is here of importance to obſerve, that, during the time the blood is diſcharging, the member ought to be kept in exactly the ſame poſture it was in when the lancet was firſt introduced: Otherwiſe, the orifice in the ſkin is apt to ſlip over the opening in the vein; a circumſtance which always proves inconvenient, and on ſome occaſions produces a good deal of trouble by the blood from the vein inſinuating itſelf into the ſurrounding cellular ſubſtance.

In taking hold of the lancet, we have directed the ſcales to form rather an acute angle with the blade of the inſtrument. It will even anſwer when they are at right angles; but a farther ſeparation proves always troubleſome, by throwing the ſcales too much back upon the operator's hand. The length of inſtrument left out from between the finger and thumb is another circumſtance requiring our attention; for unleſs a ſufficient quantity of it is left uncovered, the operator cannot act with freedom. In lancets of an ordinary length, one half of the

the blade, as I have already remarked, or very nearly that quantity, ought always to be left out.

The entry of the lancet into the vein is the next circumſtance we have deſired to be attended to. By very little attention the entrance of the inſtrument into the vein may be diſtinctly perceived; for as ſoon as its point has entered the cavity of the veſſel, the reſiſtance to its farther progreſs is evidently found to be much diminiſhed; and immediately on the opening being in any degree enlarged, the blood begins to ruſh out, which is the cleareſt proof of the operation being ſo far complete. On being thus rendered ſure that the lancet has got into the vein, we have alſo deſired that it may be carried forward in an oblique direction, taking care to keep the point of the inſtrument in the ſame degree of elevation from the inſtant it has paſſed fairly through the coats of the vein; and to this part of the operation we would beg the moſt particular attention. To the want of neceſſary caution in this matter, or rather to the improper regulations held forth upon it by every writer on this ſubject, much of the riſk attending this operation ought to be attributed.

The propriety of an oblique direction for the courſe of the orifice is very obvious: For, when made altogether longitudinal, the ſides of the wound are apt to fall immediately together, ſo as not to admit of a free diſcharge of blood; and, on the other hand, when the vein is cut entirely acroſs, troubleſome conſequences commonly enſue from the wound being very difficult to heal: An orifice ſomewhat oblique with reſpect to the courſe of the vein, is therefore preferable to either. But the material circumſtance to be kept in view is the direction of the point of the lancet after it has got fairly into the vein. By almoſt every author who has written upon bloodletting, as ſoon as the lancet is known to have got into the vein, in order to extend the orifice to a ſufficient length, we are directed, very properly,

to

to carry the inſtrument forward: But in what manner are we deſired to do ſo? By raiſing the heel of the lancet, as it is termed, at the ſame time that the point and edge of it is in ſome degree puſhed forward, ſo as to make the point of the inſtrument the centre of motion.

The reaſon of this laſt precaution is, that the internal orifice of the vein may not be farther extended upwards than the external wound in the ſkin and other integuments; as ecchymoſes, or effuſions of blood into the cellular ſubſtance, have with the broad ſhouldered lancet been found frequently to occur from a contrary management. But when the ſpearpointed lancet is uſed, this is an occurrence which may be always avoided; as, from the narrow point of the inſtrument, it may with ſafety be carried on in the cavity of the vein as far as is neceſſary. The orifice produced by it in the vein, muſt, when the operation is properly done, be always of very nearly the ſame extent as the external wound in the teguments: And by the ſame management we avoid that capital riſk which it is evident muſt always occur from an implicit obedience to the direction alluded to; for one certain effect of raiſing the heel, or back part of the lancet, is, that the point of the inſtrument muſt in the ſame proportion be depreſſed; and the conſequence of lowering the point of the lancet, already perhaps ſliding along the under ſide of the vein, muſt at once appear to be very hazardous. For in ſuch circumſtances, if the point of the inſtrument be depreſſed, which muſt undoubtedly happen if the back part of it be elevated, it muſt for certain paſs through the back part of the vein; ſo that if either an artery, nerve, or tendon, lie contiguous, they muſt of neceſſity be wounded; and I am perfectly convinced, that this cauſe alone has frequently been the origin both of wounded arteries, and of pricks in the nerves and tendons. So that as the hazard of the practice, whenever it

is

is attentively conſidered, muſt at once appear evident, and as the ſuppoſed inconvenience ariſing from a contrary mode of operating is effectually prevented by the uſe of the ſpearpointed lancet, all ſuch riſks therefore ſhould be carefully avoided.

With reſpect to the ſize of orifice in caſes of bloodletting, this circumſtance muſt at all times be determined by the nature of the diſorder for which the evacuation is preſcribed. When a ſudden loſs of a conſiderable quantity of blood is intended, either with a view to produce a ſtate of fainting, or for any other reaſon, a free large orifice is abſolutely neceſſary; but in ordinary practice, no neceſſity occurs for this.

In uſing a ſpearpointed lancet, an orifice of about an eighth part of an inch in length will in general anſwer every purpoſe; but when a lancet with broad ſhoulders is uſed, an opening of twice that ſize is little enough; for with ſuch an inſtrument the orifice in the vein can ſeldom be above half the extent of the external opening.

After withdrawing the lancet from the orifice, we have directed the thumb of the left hand to be removed from the place it was made to occupy. Many circumſtances may appear to be related here with unneceſſary minuteneſs, and this among others may poſſibly be conſidered as one; but in an operation of importance, every particular requires much attention. Now, one material uſe of the thumb placed below the part where the lancet was directed to enter, is, to keep the teguments and vein firm, ſo as to prevent the latter from rolling. But another advantage occurring from it is, that by making a ſufficient degree of preſſure upon the vein, it thereby prevents any conſiderable quantity of blood from eſcaping between the time of removing the lancet, and the application of one of the cups for receiving the blood from the orifice in the vein. During this period it frequently happens, that a

good

good deal of blood is discharged, to the great annoyance both of the patient, the operator, and bystanders; a circumstance which, with a little attention, may be always effectually prevented.

V. When the vein is properly cut, and the orifice is made sufficiently large, it rarely occurs that any difficulty is experienced in procuring all the blood that is wanted. But it now and then happens otherwise, either from the orifice of the skin and other parts having receded from the opening in the vein, or from the patient having become faintish; a situation always unfavourable to a free discharge of blood. When this last circumstance occurs, a stream of fresh air ought to be admitted to the apartment, wine or some other cordial should be administered, and the patient ought to be laid into a horizontal posture. By these means the faintishness will in general be soon removed; but if still the blood should not flow freely, the member ought to be put into all the variety of positions that can probably assist in bringing the opening of the skin and other teguments to correspond with that of the vein, which will soon be known to have happened by the blood beginning instantly to flow. Throwing the muscles of the part into constant action, by giving the patient a cane or any other firm substance, to turn frequently round in his hand when the operation is done in the arm, will often answer in producing a constant flow of blood from a vein, when every other means has failed: And lastly, when the pulse in the inferior part of the member is felt very feeble, or especially if it cannot be distinguished at all, we may be thereby rendered certain that the ligature is too tight, and may in general have it in our power to produce an immediate flow of blood by removing the compression thus improperly made upon the arteries of the part.

VI. A quantity of blood proportioned to the circumstances of the disorder, being thus discharged,

the

the preſſure upon the ſuperior part of the vein ſhould be immediately removed; and this being done, if the ſpearpointed lancet has been uſed, all farther diſcharge of blood will in general ſtop immediately. The contrary, however, ſometimes occurs, and blood continues to flow freely even after the ligature is removed. When this is the caſe, the operator ought to compreſs the vein both above and below the orifice by means of the finger and thumb of one hand, ſo as to prevent any farther loſs of blood: And this being done, the limb ought to be waſhed and entirely cleared of any blood that may have fallen upon it; and the orifice being alſo cleared of every particle of blood, the ſides of it ſhould be laid as exactly together as poſſible, and a piece of what is named courtplaſter, or any other that is ſufficiently adheſive, being ſo applied as to retain them, it will ſeldom happen that any kind of bandage is neceſſary: But when the blood has iſſued with uncommon violence during the operation, and has been difficult to command after the removal of the ligature, in ſuch inſtances it will be prudent to apply a ſmall compreſs of linen over the plaſter, and to ſecure the whole with a linen roller properly applied round the member.

Before applying the plaſter, we have directed the orifice to be perfectly cleared of every particle of blood; and this, it may be obſerved, is a circumſtance of more importance than is commonly imagined; for, by not attending particularly to this point, and from want of exactneſs in cloſing the lips of the orifice, painful ſwellings and conſequent ſuppurations are often induced, which a very little attention would have eaſily prevented. In every inſtance when the operation is properly done, the wound ought to heal by what ſurgeons call the Firſt Intention, that is, by the parts adhering to one another without the formation of matter; but this can ſeldom happen if the lips of the ſore have not

been

been very neatly laid together after all the blood has been perfectly cleared away.

Another argument of importance, too, occurs for neatneſs in this matter. Among other troubleſome conſequences ariſing now and then from bloodletting, inflammation produced in the cavity of the vein has in ſome inſtances been known to occaſion much miſchief; and as nothing tends more to produce it than the admiſſion of air to the part, by the orifice in the vein not being properly cloſed, this circumſtance of itſelf ſtrongly points out the propriety of the caution here given: For although ſuch inflammatory affections in the internal ſurfaces of veins are not by any means to be conſidered as frequent, yet it is certain they do now and then occur; and as the conſequences ariſing from them, eſpecially if ſuppuration is induced, muſt commonly terminate fatally, they ought certainly, by every means in our power, to be ſtrictly guarded againſt.

VII. We come now to ſpeak of ſome troubleſome conſequences which on ſome occaſions are found to occur from bloodletting, and which every operator ought to be as much as poſſible prepared to remedy. The moſt material of theſe are, ſmall tumors occaſioned by effuſions of blood from the orifice of the vein into the ſurrounding cellular ſubſtance; wounds of the artery lying contiguous to the vein; pricks of the nerves and tendons; and laſtly, inflammation, induced in the internal cavity of the vein, as we have juſt now mentioned. Theſe we ſhall now, under ſeparate heads, proceed to treat of particularly*.

I SECTION

* Among other reaſons which we have given for preferring a ſpear-pointed lancet, it was obſerved, that by means of it the operation of bloodletting is attended with much leſs pain than when the broad ſhouldered lancet is uſed: And the prevention of pain is a matter of ſuch importance, that nothing ſhould be omitted that can in any degree contribute to it.

In every operation it is of much conſequence to have all the neceſſary inſtruments in the moſt complete order; but in no inſtance is it of ſuch importance to attend to this circumſtance as in bloodletting.

Well

SECTION II.

Of a Thrombus, *or* Ecchymosis.

WE have already desired, that in the operation of bloodletting, the member should be retained in the very same posture it was in when the lancet was introduced, till the whole quantity of blood intended to be taken is evacuated. When this direction is not duly attended to, it commonly happens, that a small tumor is raised immediately above the orifice in the vein, by the blood insinuating itself into the cellular substance of the neighbouring parts. Such a tumor, when round and small, is termed a Thrombus; and when more diffused, an Ecchymosis.

Immediately on the appearance of such swellings, the ligature ought to be removed from the superior part of the vein; and the member being brought into that posture which it was in when the lancet was first introduced, the ligature may be again renewed; and it will thus be frequently found that a free return of blood will be induced, which commonly carries off the swelling altogether, or at least prevents it from producing any further obstruction to the discharge of blood. But it does now and then happen, that these swellings come at once to such a size, as entirely to preclude every possibility of finishing the operation at the orifice first made in the vein. Even here, however, the ligature ought to be

Well tempered lancets will no doubt answer tolerably well, even after they have been frequently used; insomuch that I have heard even well employed Surgeons assert, that they have used one or two lancets only during the course of many years practice, without ever having them touched by a cutler. But it is very certain, that every time a lancet is used, it must be injured more or less; so that, as the prevention of pain is with most patients a matter of no small consequence, I think it ought to be laid down as a fixed rule never to use the same lancet twice, without putting it into the hands of a cutler. This I have long been in the practice of doing, not only with lancets, but with every cutting instrument; and the trouble and expense attending it is very inconsiderable, when compared with the advantages resulting from it.

be immediately removed, as the moſt effectual method of preventing an increaſe of the tumor. By continuing the bandage on the vein, the blood ſtill continues to be forced in great quantities into the ſurrounding cellular ſubſtance; and by the ſame means ſuch ſwellings are induced, as now and then give a great deal of trouble, which by a contrary management might eaſily have been prevented from coming to any conſiderable height.

In ſuch occurrences, as it is in vain to expect any conſiderable quantity of blood from the oriſice firſt made, the next ſtep to be taken, is, to finiſh the operation, not by another opening in the ſame vein, which in ſuch circumſtances would ſeldom be found to bleed freely, but in any other that lies moſt convenient.

When tumors of this kind do not arrive at any great ſize, very little is neceſſary to be done for their diſperſion, as the effuſed blood is commonly ſoon abſorbed. When it is found neceſſary, however, to have recourſe to diſcutient remedies, thoſe of the aſtringent kind are by far the moſt effectual; and of this claſs brandy or any other ardent ſpirits are perhaps as uſeful as any. Compreſſes wet in a weak ſolution of crude ſal ammoniac in vinegar, and applied with a very moderate degree of preſſure, have likewiſe been found very effectual in diſcuſſing ſuch ſwellings.

Inſtances, however, do now and then occur, though by no means very frequently, of the blood collected in ſwellings of this nature being in too great quantities to be all abſorbed: And when this happens to be the caſe, as no good ſuppuration can be induced where there is nothing but red blood contained in the tumor, it ought to be immediately laid open as ſoon as there is reaſon to ſuppoſe that no farther diminution of ſize will probably occur from abſorption. This being done, and the coagu-

lated

lated blood being evacuated, the ſore falls to be treated like any ordinary wound.

But occurrences of this nature, are in general of very little importance when compared with other accidents which now and then proceed from bloodletting. The firſt of theſe we are to treat of are wounds of arteries.

SECTION III.

Of Wounds *of the* Arteries.

IN the ſmaller arteries, as for inſtance in any branch of the temporal artery, openings may be made without much riſk; but we know from long and repeated experience, that wounds in the larger arteries often prove hazardous, and very ſeldom heal without a great deal of trouble.

When in bloodletting we have reaſon to ſuſpect that an artery has been wounded through the orifice made in the vein, and that blood is diſcharging at the ſame orifice both from the artery and the vein, it becomes a matter of importance for an operator to know with preciſion whether it is ſo or not. There is only one method by which a complete degree of certainty can be obtained on this point; and it is this:

When the blood is diſcharged from the vein only, if a degree of preſſure be applied both immediately above and below the orifice ſufficient for compreſſing the ſides of the vein together, all farther evacuation of blood ſhould inſtantly ſtop, even though the preſſure is not ſo conſiderable as to affect the artery below; but on the contrary, if part of the blood be thrown out from the wounded artery, this preſſure upon the vein, inſtead of putting a ſtop to the diſcharge, ſhould rather tend to make it more conſiderable. When at the ſame time the blood is diſcharged *per ſaltum*, this will no doubt ſerve as a corroborating

corroborating circumſtance: But this teſt of itſelf, we may remark, is by no means ſo deciſive as is commonly imagined; for, an orifice made in a vein lying directly above and immediately contiguous to a conſiderable artery, receives the influence of the arterial pulſation to ſuch a degree, as to diſcharge blood very nearly in the ſame manner as if the artery itſelf was cut. No other proof however, is neceſſary of the artery being wounded, than the one we have already mentioned; for, if after the vein is thoroughly compreſſed both above and below the orifice, blood ſtill continues to be diſcharged in great quantities and with any conſiderable force, our ſuſpicions of the artery being wounded are then reduced to the utmoſt degree of certainty.

Allowing this to be the caſe, that in ſuch circumſtances we are rendered certain of the lancet having pierced the artery, What remedy ought we to have recourſe to? Not the means uſually adviſed, but the very reverſe.

In all ſuch occurrences, we are conſtantly directed to tie up the part with as much firmneſs as poſſible, in the firſt place with different compreſſes placed over the orifice of the vein; and leſt theſe ſhould not produce a ſufficient degree of preſſure, a piece of money or other hard ſubſtance is deſired to be added, and the whole to be ſecured with a roller very tightly applied. But what effect ought we reaſonably to expect from much preſſure applied in this manner? We cannot ſuppoſe it was ever intended that any preſſure of this kind ſhould be ſo conſiderable as to compreſs the artery itſelf; for by that means when the principal artery of a part is wounded, a total ſtop would be put to the circulation in the whole limb: And if the preſſure, on the contrary, is to be applied in ſuch a degree as to compreſs the ſides of the veins only, one certain effect of this muſt be, to occaſion a conſiderable reſiſtance to the flow of blood from the artery; and that fluid being

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thus obſtructed in its natural courſe, will neceſſarily be much more readily effuſed at the opening in the artery, than if the veins had been all left free and pervious to receive and tranſmit it.

In all ſuch caſes, therefore, inſtead of applying much preſſure, we ought to attempt every means of relaxing the veins to the utmoſt; and in order to command the blood, the lips of the wound ſhould be laid together, and retained by ſtraps of adheſive plaſter only, without any bandage whatever. And as there is not a more effectual method of relaxing the ſyſtem at large, and the vaſcular ſyſtem in particular, than by diſcharging large quantities of blood very quickly, ſo ſoon as it is known that an artery has been accidently opened, it ought to be immediately determined to evacuate by the orifice newly made, as much blood as the patient can eaſily bear to loſe. By theſe means, and by enjoining ſtrict attention to reſt of body, in order to prevent as much as poſſible the undue action of the arterial ſyſtem, and by keeping the body cool, with the uſe of gentle purgatives, a low diet, and farther bloodlettings when neceſſary, there may always be at leaſt ſome chance of ſuch wounds in arteries being brought to reunite: Whereas a contrary management, in which much preſſure upon the veins is adviſed, muſt univerſally do miſchief, by forcing the artery to empty itſelf at the only paſſage the blood in ſuch circumſtances can be diſcharged at, *viz.* the opening newly made by the lancet; and by ſuch treatment many aneuriſmal ſwellings, I am confident, have been produced, which by the management now pointed out might eaſily have been prevented.

In caſes of wounded arteries, however, it will frequently happen, that no treatment whatever will ſucceed; the orifice in the artery will not reunite, and blood in conſiderable quantities is effuſed into the contiguous parts. Even in this ſtate of the complaint, ſtrong preſſure is adviſed, with a view to diſ-

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ſipate the tumor: But unleſs the ſwelling is of a very ſoft nature, and unleſs the blood contained in it ſtill remains in a ſtate of fluidity, no preſſure whatever can have any influence in diſcuſſing it; for, whenever the accumulated blood has acquired any moderate degree of firmneſs, we cannot ſuppoſe that preſſure will have any effect in driving it back by the paſſage from whence it originally came. Nor does it appear, that in ſuch circumſtances, compreſſion is of any uſe in forwarding the abſorption of extravaſated blood. From theory alone we might readily be induced to draw this concluſion; but in fact we do not know a ſingle inſtance in which preſſure in ſuch caſes appeared to be productive of any advantage.

There is indeed a particular ſpecies of ſwelling, which now and then occurs on an artery being in this manner wounded by a lancet that has previouſly paſſed through a neighbouring vein, and in which moderate preſſure has proved ſerviceable. When an artery thus wounded, lies quite contiguous to the correſponding vein, the opening between the two veſſels on ſome occaſions continues pervious after the external orifice in the vein is cloſed, ſo as to produce a direct communication between the one and the other; and the vein in this manner receiving the full force of the arterial pulſation, at the ſame time that its coats are not poſſeſſed of a firmneſs ſufficient to reſiſt it, a ſwelling of the vein comes of courſe to be produced. In all ſuch inſtances, moderate preſſure, we may readily ſuppoſe, muſt be of very great uſe, by ſerving as a ſupport to the diſtended vein, and by thus preventing any farther increaſe of its bulk; but in no other ſwelling ariſing from blood effuſed from an artery can preſſure be of any uſe; on the contrary indeed, for the reaſons already enumerated, there is great cauſe for ſuſpecting that it has frequently done much miſchief. When we are rendered quite certain that an artery has been opened, and that the

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tumor produced by it is owing to blood collected in the cellular membrane around it, if keeping the limb in an eaſy relaxed poſture, and the veins perfectly free from preſſure, together with the other means formerly pointed out, do not prevent a farther increaſe of the ſwelling, no other mode of treatment with which we are acquainted will have much influence.

The tumor ſtill continuing, by the communication between it and the artery being conſtantly kept up, and none of the means employed for its diſperſion having any influence, the diſorder in that ſtate is to be conſidered as forming a ſpecies of aneuriſm, an ailment of which we will treat more particularly afterwards.

SECTION IV.

Of WOUNDS *or* PRICKS *in the* NERVES *and* TENDONS.

THE diſorder we have now been deſcribing, *viz.* wounds of the arteries, as well as ſimilar affections of the tendons, ought never to happen in the hands of a ſurgeon who pretends to any tolerable degree of ſteadineſs; for, as the arteries and tendons are both parts which previous to the operation may be eaſily diſtinguiſhed by the finger, ſo as that their ſituation may be aſcertained with exactneſs, it muſt always be the fault of the ſurgeon, if the point of his lancet is not ſo directed as to avoid them. One principal cauſe of ſuch accidents occurring in bloodletting, is, as we have already ſhown, the ordinary practice of depreſſing the point of the lancet, after it has entered the cavity of the vein. This, however, we have demonſtrated to be always unneceſſary, and in many inſtances to be productive of very pernicious effects. But although, by proper attention to this part of the operation, we may always with certainty avoid the

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arteries and tendons; yet it may be ſaid, that the nerves, which in general are ſo ſmall as not to be previouſly diſtinguiſhed, run at all times a great riſk of being wounded, and that the accidents which now and then occur from wounded nerves, are well known to be productive of as dreadful conſequences as have ever ſucceeded to the operation of bloodletting.

But although the nerves from the ſmallneſs of their ſize cannot previouſly be diſtinguiſhed by the fingers; yet, if ſufficient attention be given to the direction of the point of the lancet, ſo as to avoid with certainty carrying the inſtrument through the back part of the vein, the ſame means which tend to ſecure the arteries and tendons, will with almoſt equal ſureneſs prove a ſafeguard to the nerves: For, if the operator enters his lancet, as he ought always to do, on the ſuperiour part of the vein, and if he does not cut the vein entirely acroſs by puſhing the lancet through to the oppoſite ſide of it, he can never run any riſk of wounding the contiguous nerves: For theſe, though they run ſo near to the veins, yet either lie immediately below them, or at leaſt are ſituated ſo far down upon their ſides as to be out of all riſk of being wounded, if the lancet is made to enter where it ought to do; and it muſt always be the ſurgeon's fault if the inſtrument is puſhed out at the oppoſite ſide of a vein. I may venture to aſſert, that no inconvenience of this kind ever happens, from the wound made by a lancet in entering the anteriour part of a vein: It is always on the oppoſite ſide of the vein that any miſchief of this kind is produced, when the lancet, as we have already obſerved, is puſhed entirely through; which it never ought to be, and which every ſurgeon ought to have ſteadineſs enough to prevent.

But although a very ordinary degree of caution would eaſily prevent every occurrence of this nature; and although, when accidents of this kind do

happen, the ſurgeon is almoſt in every inſtance to blame; yet experience has on different occaſions evinced, that, either from the want of attention, or from the operator not being poſſeſſed of a ſufficient degree of ſteadineſs, however eaſily ſuch inconveniences ought to be prevented, yet ſtill they do frequently occur. Nerves, and even tendons, are ſometimes pricked; and the dreadful train of ſymptoms which ſuch accidents commonly produce is almoſt inevitable.

It ſometimes happens immediately on the introduction of the lancet, that the patient complains of a moſt exquiſite degree of pain; and when this occurs, we may reſt aſſured that either a nerve or tendon has been wounded. On ſome occaſions, by proper management, ſuch as evacuating a conſiderable quantity of blood at the orifice newly made, by keeping the part at perfect reſt, and preſerving the patient in as cool a ſtate as poſſible, the pain at firſt complained of will gradually abate, and at laſt go off entirely without any bad conſequence whatever.

At other times, however, this pain which occurs inſtantaneouſly on the introduction of the lancet, inſtead of abating, begins ſoon to increaſe; a fullneſs, or ſmall degree of ſwelling, takes place in the parts contiguous to the wound; the lips of the ſore become ſomewhat hard and inflamed; and in the courſe of about twenty four hours from the operation, a thin watery ſerum begins to be diſcharged at the orifice.

If, by the means employed, relief is not ſoon obtained, theſe ſymptoms generally continue in nearly the ſame ſtate, for two, or perhaps three days longer. At this time the violent pain which at firſt took place becomes ſtill more diſtreſſing; but inſtead of being ſharp and acute as before, it is now attended with the ſenſation of a burning heat, which ſtill goes on to increaſe, and proves during the whole courſe of the ailment a ſource of conſtant diſtreſs to the patient.

patient. The fullneſs and hardneſs in the lips of the wound begin to increaſe, and the ſwelling in the neighbouring parts gradually extends over the whole member; from the foot upwards over the thigh, when the operation has been done in the lower extremity; and from the elbow down the forearm, and along the humerus over to the pectoral muſcle and other contiguous parts, when the accident has occurred at the uſual place of bloodletting in the arm.

The parts at laſt become exceedingly tenſe and hard; an eryſipelatous inflammatory colour frequently appears over the whole member; the pulſe by this time has generally become very hard and quick; the pain is now intenſe, the patient exceedingly reſtleſs; twitchings of the tendons occur to a greater or leſſer degree; on ſome occaſions, a locked jaw and other convulſive affections ſupervene; and, all theſe ſymptoms continuing to increaſe, it moſt frequently happens, that the ſufferings of the unfortunate patient are terminated by death only.

Bloodletting, from being ſo very generally practiſed, may by many be conſidered as an operation by no means either ſo difficult in execution, or ſo dreadful in its conſequences, as is here repreſented. Such inſtances indeed are not to be conſidered as frequent occurrences; but they happen often enough to convince us of the neceſſity of very great caution in this operation. In the courſe of my experience I have known ſeveral inſtances where the conſequences of bloodletting have proved fatal, and the dreadful train of ſymptoms we have already enumerated uniformly occurred in all of them.

Different opinions have prevailed reſpecting the cauſe of theſe ſymptoms: By ſome they have been imputed to wounds of the tendons; and by others the tendons are ſuppoſed to be ſo entirely deſtitute of ſenſibility, as to be quite incapable of producing ſo much diſtreſs; ſo that wounds of the nerves they

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conſider in all ſuch occaſions as the true cauſe of the various ſymptoms we have mentioned.

On one or the other of theſe ſuppoſitions the various phenomena which occur in this diſorder have been explained, till a different opinion was at laſt ſuggeſted by the ingenious Mr. John Hunter of London. Mr. Hunter ſuppoſes, that all the ſymptoms thus induced by the operation of bloodletting, may be more readily accounted for, from an inflamed ſtate of the internal ſurface of the vein, than from any other cauſe. Such a ſtate of the vein he has often traced in horſes that have died of ſuch ſymptoms from venæſection, where the internal coat of the vein was always found much inflamed, not only in the neighbourhood of the part where the orifice was made; but on ſome occaſions the inflammation extended along the whole courſe of the vein, and ſeemed at laſt to reach the heart itſelf. Some inſtances too have occurred, of the ſame appearances in the human body, where the veins after death were found in a ſtate of high inflammation. And on other occaſions, inflammation having in this manner been once excited, has been known to terminate in ſuppuration; and the matter thus produced, being in the courſe of circulation carried to the heart, Mr. Hunter ſuppoſes that in ſuch caſes death may have been induced by that cauſe alone.

There can be no reaſon to doubt the fact held forth by Mr. Hunter, that in ſuch inſtances, the vein in which the orifice has been made, has frequently after death been found greatly inflamed: But however ingenious his arguments may be, for concluding that this ſtate of the vein is the original cauſe of all the bad ſymptoms enumerated; and although we muſt allow, that ſuch an inflammatory affection of a vein muſt have a conſiderable influence in aggravating the various ſymptoms previouſly induced by other cauſes; yet I think we may very fairly conclude, that it could not probably in any one inſtance be able to

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account in a satisfactory manner for their first production.

In all the instances of this dreadful complaint which I have had an opportunity of seeing, the patient at the very instant of the operation felt a very unusual degree of pain. In some cases, the violence of the pain was almost insupportable. Now this we can never suppose to have been produced by the mere puncture of a vein; for although the coats of veins are not perhaps entirely destitute of feeling, yet we know well, that they are not endowed with such a degree of sensibility as to render it probable such intense pain could ever be induced by their being punctured in any way whatever. This inflamed state of the veins therefore, as detected by Mr. Hunter after death, must be considered rather as being produced by, than as being productive of, such affections; and that such ailments should frequently produce an inflammation of the contiguous veins, is a very probable conjecture. In the course of about forty eight hours from the operation, when the febrile symptoms are just commencing, such a degree of hardness and evident inflammation is induced over all the parts contiguous to the orifice, that it would be surprising indeed, if the vein, which is thus perhaps entirely surrounded with parts highly inflamed, should not be inflamed likewise.

We shall therefore proceed upon the supposition of this inflamed state of the veins being a consequence, rather than the cause, of such ailments; and of course we now revert to one or other of the opinions long ago adopted on this subject, that all the train of bad symptoms found on some occasions to succeed to venæsection, proceed either from the wound of a nerve or of a tendon.

That a partial wound of a nerve will now and then produce very distressing symptoms, no practitioner will deny: But it has been attempted to be shown, as we have already remarked, that tendons

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are almoſt totally deſtitute of ſenſibility ; and it has therefore been ſuppoſed, that their being wounded, can never account for the various ſymptoms known to occur in ſuch caſes.

There is great reaſon, however, to think, that in different inſtances the ſame train of ſymptoms have been induced by different cauſes ; that in one inſtance a wounded nerve, and in others pricks of the tendons, have given riſe to them. Being decidedly of this opinion myſelf, I think every perſon muſt be ſo, who has paid much attention to the ſubject ; but as the ſame method of treatment proves equally applicable, whether the diſeaſe has originated from the wound of a nerve or of a tendon, we do not think it neceſſary to enter here into a more minute diſcuſſion of the queſtion. Having already in a former ſection ſhown how ſuch accidents may be almoſt always avoided, we ſhall now proceed to conſider the means beſt calculated for preventing the ſymptoms coming to a great height, when it is diſcovered that either from inadvertence or any other cauſe the miſchief has actually happened.

Whenever a patient at the time of the operation complains of a very exquiſite degree of pain, we may always be certain that ſome parts have been wounded which ought not to have been touched. When this unfortunately happens, if proper attention be given immediately, much may be done to obviate the acceſſion of thoſe ſymptoms which ſuch a cauſe will otherwiſe certainly induce.

In order therefore to prevent as much as poſſible the conſequent inflammation and other ſymptoms which uſually enſue, a conſiderable quantity of blood ſhould be immediately diſcharged at the orifice juſt made ; the limb, for ſeveral days at leaſt, ought to be kept in a ſtate of perfect reſt, care being at the ſame time taken that the muſcles of the part be all preſerved in as relaxed a ſtate as poſſible ; the patient ſhould

ſhould be kept cool ; on a low diet ; and, if neceſſary, gentle laxatives ought to be adminiſtered.

By ſuch management alone, the fatal ſymptoms we have enumerated may frequently be prevented ; and when they do occur in caſes where the above precautions have not been taken, they may be conſidered to be as much the conſequence of negligence in the ſubſequent treatment, as of any thing peculiarly bad in the nature of the original accident.

When notwithſtanding, however, of the means recommended, the ſymptoms, inſtead of diminiſhing, rather become more violent, if the lips of the orifice turn hard and more inflamed, if the pain becomes more conſiderable, and eſpecially if the ſwelling begins to ſpread, other remedies come then to be indicated. In this ſtate of the complaint, topical bloodletting, by means of leeches applied as near as poſſible to the lips of the wound, frequently affords much relief ; and when the pulſe is full and quick, it even becomes neceſſary to evacuate large quantities of blood by opening a vein in ſome other part.

The external applications uſually employed in this ſtate of the complaint, are, warm emollient fomentations and poultices, and in ſimilar affections of other parts no remedies with which we are acquainted would probably be found more ſucceſsful ; for as warm fomentations and cataplaſms tend in general very powerfully to promote the formation of pus, and as nothing would ſo certainly relieve the ſymptoms which uſually occur here as a free ſuppuration, applications of this nature were made therefore with ſome apparent propriety : But from all the experience I have had in affections of this kind ſucceeding to bloodletting, I am now perfectly convinced, that little or no advantage is ever to be expected from remedies of this claſs. On the idea of being able to induce a free and kindly ſuppuration on the wound, and having great rea-

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ſon to think, from its effects in ſimilar caſes, that all the ſymptoms would be thereby rendered more mild, I muſt own that in ſeveral caſes I went into the uſe of applications of this kind to the greateſt poſſible degree. Unfortunately, however, the advantages reſulting from them never anſwered my expectations; ſo that at laſt I was induced to make trial of a very different ſet of remedies.

Although, at the time of thus uſing applications of the warm emollient kind, I did not attend particularly, to the cauſe of their failure, yet I now think that this circumſtance may be very eaſily accounted for. The parts here principally concerned being almoſt entirely membranous, and being therefore, as we have elſewhere ſhown*, incapable of yielding purulent matter, a continued courſe of warm applications, inſtead of producing the wiſhed for effect, muſt in all probability rather tend to aggravate all the ſymptoms; for when ſuch remedies do not induce a free ſuppuration, the heat they convey to the parts, by acting as a perpetual ſtimulus, muſt rather tend to increaſe the inflammation: And in fact we find, in the complaint now under conſideration, that all ſuch applications, inſtead of being productive of any advantage, rather do harm. The heat of the part is here one of the moſt diſtreſſing ſymptoms; ſo that, inſtead of affording relief, warm emollient applications rather tend to augment this very tormenting ſource of uneaſineſs. The lips of the wound, from not being capable of producing a good ſuppuration, are, by the additional heat applied to them through the medium of ſuch applications, rendered ſtill more hard, ſwelled, and of courſe more painful, and the ſwelling of the contiguous parts alſo becomes more diffuſed over the reſt of the member.

By Ambroſe Paré, Dionis, Heiſter, and others, inſtead of emollient remedies, oil of turpentine, tincture

* *Vide* Treatiſe on Inflammation and its conſequences.

tincture of myrrh, and other heating applications, are recommended. That these would not prove effectual, I cannot from experience pretend to say; for, suspecting their powerful stimulating effects might in cases of this nature prove too irritating, for parts already by disease rendered exquisitely sensible, I have never ventured to use them: But I can from repeated experience assert, that cooling astringent applications afford much more ease, and, upon the whole, in all such ailments, prove much more effectual, than warm emollients; and of this class, the most effectual I have ever used are the saturnine applications. The parts chiefly affected being alternately covered with cloths wet with a solution of saccharum saturni, and pledgits spread with Goulard's cerate, are kept more cool and easy than by any other remedy I have ever happened to use.

In all such cases, therefore, as soon as a number of leeches proportioned to the violence of the symptoms have been applied to the parts chiefly affected, and have discharged a sufficient quantity of blood, the swelling ought to be covered with pieces of soft linen wet in the saturnine solution; and these being kept constantly moist for the space of a few hours, should be succeeded by Goulard's cerate; and thus every part in any degree affected, ought to be alternately covered with one or other of these applications, as long as any degree of swelling remains.

The febrile symptoms which occur, must at the same time be attended to, by keeping the patient cool; on a low diet; preserving a lax state of the bowels; and, if necessary, farther quantities of blood ought to be evacuated.

For the violence of the pain, which is sometimes so excessive as to destroy the patient's rest entirely, opiates ought to be freely exhibited; and when twitchings of the tendons and other convulsive symptoms supervene, medicines of this kind become still more particularly necessary. In order, howev-

er, to have a proper influence in this ſtate of the complaint, opiates ought to be given in very full doſes; otherwiſe, inſtead of anſwering any good purpoſe, they conſtantly tend to aggravate the different ſymptoms, not only by increaſing the heat and reſtleſſneſs, but by having an evident influence in rendering the ſyſtem more ſuſceptible than it was before of the pain and other diſtreſſing effects produced upon it by the wound: Whenever opiates therefore are in ſuch circumſtances employed, the doſes ought always to be conſiderable.

It often happens, however, in this very alarming diſorder, either from neglecting the matter altogether on the accident firſt happening, as is too frequently the caſe, or from an improper ſubſequent treatment by warm emollient applications, that opiates and all the other remedies enumerated are afterwards uſed without any advantage whatever: The fever, pain, and ſwelling of the parts continuing, convulſive affections of the muſcles at laſt occur; all tending to indicate the moſt imminent danger. In this ſituation, if we have not immediate recourſe to ſome effectual means, the patient will ſoon fall a victim to the diſorder; and the only remedy from which much real advantage is to be expected, is a *free and extenſive diviſion* of the parts in which the orifice producing all the miſchief was at firſt made. We know well from the repeated experience of ages, that much more pain and diſtreſs of every kind is commonly produced by the partial diviſion either of a nerve or of a tendon, than from any of theſe parts being at once cut entirely acroſs. Now the intention of the operation here recommended, is, to produce a complete diviſion of the nerve or tendon we ſuppoſe to have been wounded by the point of the lancet, and which we conſider as the ſole cauſe of all the ſubſequent diſtreſs.

The operation now recommended being attended with a good deal of pain, and being put in practice

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for the removal of ſymptoms from which it is perhaps difficult to perſuade the patient that much danger is to be apprehended, all the remedies we have mentioned ſhould be firſt made trial of before it is propoſed: But at the ſame time, care ought to be taken, that the diſorder be not allowed to proceed too far before we have recourſe to it; for if the patient ſhould be previouſly much weakened by the feveriſh ſymptoms having continued violent for any length of time, neither the remedy now propoſed, nor any other with which we are acquainted, would probably have much influence. As ſoon therefore as the courſe already preſcribed has been fairly tried, and is found to be inadequate to the effects expected from it, we ought immediately to have recourſe to a free diviſion of the parts chiefly affected; and the manner of doing it is this:

As all the contiguous parts are now ſuppoſed to be much ſwelled and in a ſtate of high inflammation, it is impoſſible to get proper acceſs either to the nerve or tendon, cut by means of a large and extenſive inciſion; and as this cannot be affected without ſome riſk, of opening at leaſt ſome large branches of arteries, the firſt ſtep to be taken in this operation is, to ſecure the parts, againſt the effects of ſuch an occurrence, by the application of the tourniquet on the ſuperior part of the member. This precaution is neceſſary, not only for guarding againſt the loſs of blood which would enſue from a diviſion of any of the large arteries, but for preventing that interruption which would otherwiſe be occaſioned by a conſtant diſcharge of blood from the ſmaller veſſels during the operation. The tourniquet indeed is more particularly requiſite with a view to the prevention of this laſt inconvenience, than for any other reaſon; for although it is proper by means of it to guard againſt the effects to be expected from a diviſion of any of the large arteries,

yet

yet with proper caution ſuch an occurrence may in moſt caſes be very eaſily avoided.

The tourniquet then, being properly applied, a tranſverſe inciſion ſhould be made with a common ſcalpel*, upon the parts chiefly affected, and it ought to run in a direction exactly acroſs the original orifice in the vein.

In every ſurgical operation, raſhneſs is undoubtedly improper, and is often productive of diſagreeable conſequences ; but unneceſſary caution, which almoſt conſtantly proceeds from the operator being inaccurate and confuſed in his ideas of the anatomy of the parts, generally produces ſuch a degree of timidity, as ultimately proves more hurtful to the patient, than even an unuſual degree of boldneſs ; for in every operation where an inciſion is neceſſary, if the firſt cut is not made fully ſufficient for the intended purpoſe, all the ſubſequent ſteps of it are commonly either much retarded, or perhaps rendered entirely ineffectual.

In no operation whatever, is it more neceſſary than in this, to act with proper freedom in laying the parts ſufficiently open by the external inciſion. A ſmall inciſion puts the patient to nearly the ſame degree of pain as a larger cut ; and it has this material inconvenience, that the ſurgeon cannot go on with the future ſteps of the operation with ſo much eaſe and expedition as when an extenſive opening is made at firſt.

The external teguments being thus freely divided, the operator is now to proceed in a gradual manner, making one ſlight inciſion after another, taking care, if poſſible, to avoid wounding either the larger arteries or veins ; and he is to go on in this way, to endeavour to detect the wounded nerve ; or if there is no poſſibility of doing ſo, even by great caution and nicety in wiping away with a ſponge every particle of blood as he goes along, he muſt ſtill

* For the moſt proper form of a ſcalpel, ſee Plate IV.

ſtill continue to proceed in this ſlow gradual manner, till he has divided every part between the ſkin and perioſteum ; the tendons, larger arteries, and veins excepted.

At this time the tourniquet ſhould be looſened ; and in all probability the patient will be found to expreſs much ſatisfaction at what has been done : For, if the part is thus divided which originally had been pricked by the lancet, and from whence all the ſubſequent diſtreſs proceeded, an immediate relief will now be obtained ; but, on the contrary, if the pain ſtill continues violent, we are thereby rendered almoſt certain that the miſchief lies altogether in one or other of the tendons. An accurate examination, therefore, muſt now be made, by clearing the parts effectually with a ſponge ; and that tendon lying moſt contiguous to the vein in which the orifice was made, will in all probability be found either wounded, or in an evident ſtate of inflammation ; but at all events, whether any ſuch appearances are detected or not, no heſitation whatever ſhould occur as to the propriety of dividing that tendon which lies moſt contiguous to the vein ; or if two or even three tendinous extremities ſhould happen to lie in the way, and to be all therefore equally liable to ſuſpicion, they ought all undoubtedly to be cut entirely acroſs ; and this being properly effected, it will ſeldom happen that relief is not immediately derived from it : And at any rate, this being done, every attempt will have been made from which we could expect any benefit.

The parts having been thus freely divided, the tourniquet muſt now be made as ſlack as poſſible ; and ſuch arteries as have been wounded muſt be properly ſecured. The parts are then to be covered with ſoft eaſy dreſſings, and to be afterwards treated in the ſame manner as a wound from any other cauſe.

The

The remedy here recommended, if every circumſtance is not duly attended to, may probably be conſidered as ſevere; for ſuch an incifion carried to ſuch a depth, muſt no doubt be attended with much pain; and the diviſion of one or more tendons runs a conſiderable riſk of producing at leaſt a partial lameneſs, and that too probably for life, of the whole member: But if we conſider for a moment the importance of the object in view, every conſideration of this kind muſt immediately loſe all weight. It is not a trifling advantage we are in purſuit of, nor can ſuch a painful operation be ever with propriety recommended except in very urgent circumſtances. In the preſent inſtance, however, it is clear that the patient's life is in all probability to depend on the event of this operation; ſo that the moſt timid operator, if he is at all capable of reflection, muſt admit the propriety of putting it in practice; and from the event of almoſt every caſe of this nature, that has once advanced to the length for which we have recommended the operation in queſtion, it may with great certainty be pronounced, that every patient in ſuch circumſtances is in the utmoſt hazard of his life; ſo that in ſuch a deſperate ſituation, no remedy that affords any tolerable chance of a recovery, however painful it may be, can with propriety be condemned.

From reaſoning alone, we would readily conclude, that in all ſuch circumſtances no remedy whatever would more probably prove ſucceſsful than the operation we have now adviſed; but when the propriety of the meaſure is enforced by the ſucceſsful iſſue of repeated trials, no argument adduced againſt it ought to meet with much attention. In different occurrences of this kind, of leſs importance, I have ſeen much advantage enſue from the practice here recommended; but in one inſtance, where the patient had been blooded in the median cephalic vein of the arm, the diſorder had got to

ſuch

ſuch a height, and had ſo obſtinately reſiſted every other remedy, that there was every reaſon to ſuppoſe death muſt have enſued, had it not been for the effects of a free and very deep inciſion made into the parts affected. The patient, from being evidently in very great hazard, and in exquiſite pain, experienced almoſt inſtantaneous relief; and the ſwelling, which had previouſly reſiſted the effects of every other remedy, and had even continued to ſpread, began ſoon to abate, and a perfect recovery was obtained in a much ſhorter ſpace of time than could have been expected.

There is not therefore a point in ſurgery that I am more ſatisfied of, than the propriety of ſuch an operation in all ſuch deſperate caſes as the one we have been treating of; but to ſuch as have not happened to meet with occurrences of this nature, the remedy propoſed will not only appear to be too violent for the diſeaſe, but they will alſo be induced to conſider the length of diſcuſſion here gone into to be much more prolix than is neceſſary: A ſingle inſtance, however, of the dreadful ſymptoms now and then induced by accidents of this kind, will be fully ſufficient to convince any man, that the ſubject now under conſideration is perhaps one of the moſt important in the department of ſurgery.

All that has hitherto been ſaid on bloodletting relates to the operation in general: We ſhall now proceed to conſider the operation as it is put in practice in particular parts; and firſt of bloodletting in the arm.

SECTION V.

Of Bloodletting *in the* Arm.

BLOODLETTING is more frequently practiſed on the forepart of the arm at the joint of the elbow, than in any other part of the body. The veins

veins are in general more conſpicuous in this place; but no other reaſon can be aſſigned for this preference: On the contrary, the near contiguity of nerves, tendons, and of large arteries, to theſe veins, makes the operation more hazardous here than in any other part. From this circumſtance, therefore, I have often been induced to conſider the fixing on this part for the ordinary operation of bloodletting, as a very capital error; and the more eſpecially as blood may be drawn from veins in other parts with the ſame eaſe as from thoſe of the arm, and with much leſs danger; particularly from the veins of the neck, from thoſe of the under part of the legs, ankles, and feet.

Bloodletting in the lower extremities has indeed in general been confined to a particular ſet of diſorders; chiefly to thoſe of females: But no good reaſon, I imagine, can be aſſigned for this; for it is now well known, that, in general bloodletting, the place from whence the blood is drawn, is of little importance, and that the effects of the operation depend almoſt ſolely upon the quantity of blood that is diſcharged in a longer or ſhorter ſpace of time.

Bloodletting at the arm may be ſafely performed by a ſurgeon of ſteadineſs and attention, as in the hands of ſuch a man there can be little or no riſk of the lancet going deeper than the vein, and in this caſe nothing bad can enſue: But, in ordinary practice, I ſhould at all times rather incline to have the operation done in ſome other part. It may almoſt always be done with eaſe in the feet and ankles; and if the operation is properly performed, the ſame quantity of blood may be drawn from the veins of theſe parts, as from veins of an equal ſize in any other part of the body.

But whether the idea now ſuggeſted ſhould ever be generally adopted or not, this is ſo far evident, that if the cautions we have pointed out are proper on every occaſion when venæſection is practiſed,

they

they are neceſſarily much more ſo when the operation is done in the arm, where the veins lie ſo very contiguous to parts which cannot be wounded without producing very alarming ſymptoms.

Having already conſidered with minuteneſs the various ſteps of the operation of bloodletting, ſo far as they relate to it in a general way; in order to avoid repetitions, nothing will now be pointed out but what is particularly required in performing this operation in the arm.

In applying the ligature for the ſtoppage of the circulation, it ought to be placed about an inch or an inch and half above the joint of the elbow: and, in order to prevent the ends of it from interfering with the lancet, the knot ſhould be made on the outſide of the arm. In general, one knot might anſwer; but a ſlipknot being made above the firſt, renders it more ſecure, and it is very eaſily done.

In making choice of a vein from whence blood is to be taken, the general rules we have already laid down upon this point muſt be here particularly attended to. That vein which appears moſt conſpicuous, at the ſame time that it rolls leaſt under the ſkin, ſhould in general be fixed upon; but when an artery is found to lie immediately below, and quite contiguous to ſuch a vein, the operator, if he is not perfectly ſatisfied with his own ſteadineſs, ought rather to take ſome other. In general, however, the artery lies ſo low in this place, that the median baſilic vein, under which it commonly runs, may be opened with perfect ſafety; and as this vein in general appears more conſpicuous than any of the others, probably from the continued pulſation of the artery below obſtructing in ſome meaſure the paſſage of its contents, it is for this reaſon therefore to be made choice of rather than any of the reſt. Other circumſtances occur too, which render the median baſilic preferable to the cephalic or median cephalic veins for the operation of bloodletting.

letting. The former, viz. the median baſilic, is leſs deeply covered with cellular ſubſtance, and by lying towards the inner part of the arm it is more thinly covered with the tendinous expanſion of the biceps muſcle, than either of the others. From theſe circumſtances the operation is always attended with leſs pain when done in this vein than in any of the others; and that conſideration alone ought to have a good deal of influence in determining the choice of an operator.

In bloodletting at this part of the arm, although the operation may be done with the right hand either upon the right or left arm of the patient; yet it is much more neatly done by performing with the right hand upon the right arm, and with the left hand upon the left arm of the patient; and whoever attempts the contrary, muſt find that it cannot be done but in a very awkward manner, as the operator can never in any other way apply his hand properly to the patient's veins.

In very corpulent people, it ſometimes happens, that all the larger veins lie ſo deep as not to be diſcovered by the eye; but when they are ſenſibly felt by the fingers, even although they cannot be ſeen, they may be always opened with freedom. In a few inſtances, however, it is the caſe, that they can neither be diſtinguiſhed by the eye, nor by the finger: In ſuch a ſituation, as they may in general be met with about the wriſt, or on the back part of the hand, the ligature ſhould be removed from the upper part of the arm; and being applied about half way between the elbow and wriſt, the veins below will thereby be brought into view; and wherever a vein can be evidently obſerved, there can be no danger in having recourſe to the operation.

SECTION.

SECTION VI.

Of BLOODLETTING *in the* JUGULAR VEIN.

FOR inflammation of the throat, diſorders of the eyes, and other affections of the head, when it is wiſhed to evacuate blood from veſſels near to the parts affected, it is frequently judged proper to open the external jugular veins; and the manner of doing the operation is this:

There is only one ramification of this vein, viz. its principal poſterior branch, which can eaſily be brought ſo much into view, as to be with propriety opened; and even this lies deeply covered with parts, not only with the ſkin and cellular ſubſtance, but with the fibres of the platiſma myoides muſcle, ſo that a conſiderable degree of preſſure becomes neceſſary in order to raiſe it to any height. With a view to produce this, the operator's thumb is commonly adviſed to be placed upon the vein, ſo as to compreſs it effectually about an inch or inch and half below where the opening is to be made. This, however, ſeldom proves ſufficient for the purpoſe, as the blood, on being ſtopped in its progreſs through this branch, eaſily finds a paſſage to the other veins; ſo that unleſs the principal vein on the other ſide of the neck be alſo compreſſed, the vein to be opened can never be fully diſtended. In order to diſtend it ſufficiently, a firm compreſs of linen ſhould be applied on the largeſt vein on the oppoſite ſide of the neck; and an ordinary garter, or any other proper ligature, being laid directly over it, ſhould be tied with a firm knot below the oppoſite armpit; taking care to make ſuch a degree of preſſure, as to put an entire ſtop to the circulation in the vein, which in this way it is eaſy to do without producing any obſtruction to the patient's breathing.

This

This being done, and the patient's head being properly ſupported, the operator, with the thumb of his left hand, is now to make a ſufficient preſſure upon the vein to be opened, and with the lancet in his right hand is to penetrate at once into the vein; and, before withdrawing the inſtrument, an orifice ſhould be made large enough for the intended evacuation. It may be proper to obſerve, that a more extenſive opening ought always to be made here than is neceſſary in the arm, otherwiſe the quantity of blood is generally procured with difficulty: And beſides, there is not the ſame neceſſity for caution on this point here that there is in the arm: For it ſeldom or never happens, that any difficulty occurs in this ſituation, in putting a ſtop to the blood after the preſſure is removed from the veins; all that is commonly neceſſary for this purpoſe being a ſlip of adheſive plaſter, without any bandage whatever.

In order to bring the vein more clearly into view, ſo as afterwards to be able to open it with more exactneſs, it has been directed, that the ſkin, cellular ſubſtance, and muſcular fibres covering the vein, ſhould be previouſly divided with a ſcalpel before attempting to puſh the lancet into it. There is not, however, any neceſſity for this precaution, as it rarely happens that any difficulty is experienced in procuring a free diſcharge of blood by opening the vein and teguments at once in the manner directed: And it is here, as in every inſtance where it is neceſſary to take blood by a lancet, if it be not done at once, the patient is much diſappointed, and is ſure to attribute the failure entirely to a fault in the operator.

SECTION.

SECTION VII.

Of BLOODLETTING *in the* ANKLES *and* FEET.

WHAT has already been ſaid on the operation of bloodletting, renders it quite unneceſſary to be here in any degree minute. When blood is to be diſcharged from the veins of theſe parts, it will be readily underſtood, that the firſt ſtep to be taken is a proper compreſſion of the veins, ſo as to produce an accumulation of their contents. The ligature for this purpoſe being applied with a ſufficient degree of tightneſs a little above the ankle joint, all the branches of the vena ſaphena, both in the inſide and outſide of the foot, come at once into view; and as this vein lies every where very ſuperficial, being in general covered with ſkin only, wherever a proper vein appears conſpicuouſly it may with ſafety be opened.

With a view to encourage the diſcharge of blood, it has been a conſtant practice in bloodletting in theſe veins, to dip the feet into warm water immediately on the orifice being made. But this is a very inaccurate method of proceeding, as the quantity of blood taken in this manner can never be aſcertained with preciſion; for the blood being all mixed with the water, the operator can never be in any degree certain as to this point: And beſides, there does not appear to be any neceſſity for this aſſiſtance; for, when the compreſſion of the ſuperior part of the veins is made effectual, and the orifice is of a proper ſize, I never found more difficulty in obtaining a full diſcharge of blood from the veins of theſe parts, than from any other veins of the body.

On removing the ligature, the diſcharge is generally ſtopped at once; ſo that a piece of adheſive plaſter applied over the orifice, anſwers all the purpoſes of a bandage.

Theſe

These are the several parts from whence blood is usually taken by venæsection; but on some occasions, where the contiguous parts have been particularly affected, it has been thought advisable to open the veins of other parts, viz. those of the tongue, of the penis, the external hemorrhoidal veins, &c. When it is found necessary to discharge blood in this manner from the penis, the veins can be easily brought into view by producing an accumulation of their contents in the same manner as in other parts of the body, through the intervention of a ligature: But, in the tongue, in the hemorrhoidal veins about the anus, and other parts where compression cannot be applied, all that the surgeon can do, is, to make an orifice of a proper size in that part of the vein which shows itself most evidently; and if a sufficient discharge of blood is not thus produced, as there is no other method of effecting it, immersing the parts in warm water may in such circumstances be a very necessary measure.

Having thus considered the various modes of discharging blood by venæsection, we now proceed to arteriotomy.

SECTION VIII.

Of Arteriotomy.

WHATEVER particular advantages may in theory have been expected from arteriotomy, and however some of its supporters may in their closets have recommended it, not only as being in many instances preferable to venæsection, but as an operation perfectly safe even in vessels of considerable size; yet the most strenuous friends to the practice, have shrunk from attempting it on the larger arteries. Instances have no doubt occurred of large arteries having been opened without any danger ensuing; but these are so exceedingly rare, that no practitioner of experience will

will be induced by them, deliberately, or from choice, to open any conſiderable artery. The ſmaller branches of arteries may indeed be opened with great ſafety when they are not deeply covered, and eſpecially when they lie contiguous to bones, as in ſuch ſituations, ſo ſoon as the quantity of blood intended to be taken is diſcharged, all farther loſs of blood may be very eaſily prevented by compreſſion; but the opening of any of the larger arteries muſt be always attended with ſo much hazard, and the advantages to be expected from it in preference to venæſection are apparently ſo trifling, as muſt in all probability prevent it from ever being carried into execution.

There are very few arteries, therefore, which with any propriety can be opened; the different branches of the temporal are the only arteries indeed from whence blood in ordinary practice is ever taken: But, if a fanciful practitioner ſhould at any time incline to take blood in this manner from a different part, it may be done with great ſafety from one of the arteries running on each ſide of the fingers. About the middle of the laſt phalanx, this artery is ſufficiently large for diſcharging a conſiderable quantity of blood; in moſt caſes it lies very ſuperficial, and in this ſituation there can ſeldom much difficulty occur in putting a ſtop to the evacuation. In performing this operation on any of the temporal branches, if the artery lies ſuperficial, it may be done with one puſh of the lancet, in the ſame manner as was directed for venæſection; but, when the artery lies deeply covered with cellular ſubſtance, it is always neceſſary to lay it fairly open to view, before making the orifice with the lancet: For in all the ſmaller arteries, when they are cut entirely acroſs, there is little chance of being able to procure any conſiderable quantity of blood from them: As, when divided in this manner, they retract conſiderably within the ſurrounding parts, which commonly puts a ſtop to all further evacuation.

Some

Some degree of nicety is alſo neceſſary in making the opening into the artery, of a proper oblique direction, neither quite acroſs, nor directly longitudinal; for a longitudinal opening never bleeds ſo freely, either in an artery or in a vein, as when its direction is ſomewhat oblique.

If the opening has been properly made, and if the artery is of any tolerable ſize, it will at once diſcharge very freely without any compreſſion; but when the evacuation does not go on ſo well as could be wiſhed, the diſcharge may be always aſſiſted by compreſſing the artery immediately above the orifice, between it and the correſponding veins. The quantity of blood being thus diſcharged, it will commonly happen, that a very ſlight compreſſion on theſe ſmaller arteries will ſuffice for putting a ſtop to the evacuation. But any degree of preſſure that is found neceſſary may be applied here as in venæſection, by means of a linen compreſs and roller; the orifice being firſt entirely cleared of blood, and properly covered with a bit of adheſive plaſter. If that ſhould not be found to anſwer, a compreſs of linen ſhould be applied over it, the whole being then to be ſecured with a roller.

It happens, however, in ſome inſtances, that this does not ſucceed, the orifice continuing to burſt out from time to time, ſo as to be productive of much diſtreſs and inconvenience.

In this ſituation there are three different methods by which we may with tolerable certainty put a ſtop to the farther diſcharge of blood. *1ſt.* If the artery is ſmall, as all the branches of the temporal arteries commonly are, the cutting it entirely acroſs, exactly at the orifice made with the lancet, by allowing it to retract within the ſurrounding parts, generally puts an immediate ſtop to the diſcharge. *2d.* When that is not conſented to, we have it always in our power to ſecure the bleeding veſſel with a ligature, as we would do an artery accidentally divided in any part of the body.

body. And, laſtly, if neither of theſe methods is agreed to by the patient, we can, by means of a conſtant regular preſſure, obliterate the cavity of the artery at the place where the operation has been performed, by producing an accretion of its ſides. Different bandages have been contrived for compreſſing the temporal artery; but none of them anſwer the purpoſe ſo eaſily and ſo effectually as the one repreſented in Plate VI. fig. 3.

As ſome time, however, is required to obliterate the cavity of the artery, this method is accordingly more tedious: But to timid patients it generally proves more acceptable than either of the other two.

Having thus finiſhed the conſideration of the various methods employed for evacuating blood from the larger arteries and veins, we now proceed to the conſideration of topical bloodletting.

SECTION IX.

Of Topical Bloodletting.

WHEN, either from the ſeverity of a local fixed pain, or from any other cauſe, it is wiſhed to evacuate blood directly from the ſmall veſſels of the part affected inſtead of opening any of the larger arteries or veins, the following are the different methods employed for affecting it, viz. By means of leeches; by ſlight ſcarifications with the ſhoulder or edge of a lancet; and, laſtly, by means of an inſtrument termed a Scarificator, containing from one to twenty lancets or more, fixed in ſuch a manner, that when the inſtrument is applied to the part affected, the whole number is by means of a ſpring driven ſuddenly into it, and to a greater or leſſer depth at pleaſure. This being done, as it is the ſmaller blood veſſels only that by this operation are ever intended to be cut, and as theſe do not commonly diſcharge freely, ſome means

or other become neceſſary for promoting the evacuation.

Various methods have been propoſed for this purpoſe. Glaſſes fitted to the form of the affected parts, with a ſmall hole in the bottom of each, were long ago contrived; and theſe being placed upon the ſcarified parts, a degree of ſuction was produced by a perſon's mouth ſufficient for nearly exhauſting the air contained in the glaſs: And this accordingly was a ſure enough method of increaſing the evacuation of blood to a certain extent*. But, as this was attended with a good deal of trouble, and beſides did not on every occaſion prove altogether effectual, an exhauſting ſyringe was at laſt adapted to the glaſs, which did indeed anſwer as a very certain method of extracting the air contained in it: But the application of this inſtrument for any length of time is very troubleſome; and it is difficult to preſerve the ſyringe always air tight.

The application of heat to the Cupping Glaſſes, as they are termed, has been found to rarify the air contained in them to a degree ſufficient for producing a very conſiderable ſuction. And as the inſtrument in the ſimple form anſwers the purpoſe in view, with very little trouble to the operator, and as it is at all times eaſily obtained, the uſe of the ſyringe has therefore been laid aſide. The glaſſes for this purpoſe, it is evident, muſt be entire; for if there is the leaſt communication allowed between their cavities and the ſurrounding atmoſphere, no effect whatever will be produced by them.

There are different methods employed for thus applying heat to the cavity of the glaſs. By ſupporting the mouth of it for a few ſeconds above the flame of a taper, the air may be ſufficiently rarified; but if the flame is not kept exactly in the middle, but is allowed to touch either the ſides or bottom of the glaſs, it

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* Celſus, lib. 2. cap. 11.

is very apt to make it crack and fly in pieces. A more certain, as well as an eaſier method of applying the heat, is to dip a piece of ſoft bibulous paper in ſpirit of wine, and having ſet it on fire, to put it into the bottom of the glaſs, and, on its being nearly extinguiſhed, to apply the mouth of the inſtrument directly upon the ſcarified part. This degree of heat, which may be always regulated by the ſize of the piece of paper, and which it is evident ought to be always in proportion to the ſize of the glaſs, if long enough applied proves always ſufficient for rarifying the air very effectually, and at the ſame time, if done with any manner of caution, never injures the glaſs in the leaſt.

The glaſs having been thus applied, if the ſcarifications have been properly made, they inſtantly begin to diſcharge freely; and as ſoon as the inſtrument is nearly full of blood, it ſhould be taken away, which may be always eaſily done by raiſing one ſide of it, ſo as to give acceſs to the external air. When more blood is wiſhed to be taken, the parts ſhould be bathed with warm water; and, being made perfectly dry, another glaſs exactly of the ſize of the former ſhould be inſtantly applied in the very ſame manner; and thus, if the ſcarificator has been made to penetrate to a ſufficient depth, ſo as to have cut all the cutaneous veſſels of the part, almoſt any neceſſary quantity of blood may be obtained. It ſometimes happens, however, that the full quantity intended to be diſcharged cannot be got at one place: In ſuch a caſe, the ſcarificator muſt be again applied on a part as contiguous to the other as poſſible; and this being done, the application of the glaſſes muſt alſo be renewed as before.

When it is wiſhed to diſcharge the quantity of blood as quickly as poſſible, two or more glaſſes may be applied at once on contiguous parts previouſly ſcarified; and on ſome occaſions, the quantity of blood is more quickly obtained when the cupping glaſſes

are

are applied for a few ſeconds upon the parts to be afterwards ſcarified. The ſuction produced by the glaſſes may poſſibly have ſome influence in bringing the more deep ſeated veſſels into nearer contact with the ſkin, ſo that more of them will be cut by the ſcarificator.

A ſufficient quantity of blood being procured, the wounds made by the different lancets ſhould be all perfectly cleared of blood; and a bit of ſoft linen or charpie dipped in a little milk or cream, applied over the whole, is the only dreſſing that is neceſſary. When dry linen is applied, it not only creates more uneaſineſs to the patient, but renders the wounds more apt to feſter than when it has been previouſly wetted in the manner directed.

Although this operation is by no means difficult in the execution, yet a good deal of practice is neceſſary to perform it in a neat and ſucceſsful manner; but with a little attention, any operator may ſoon become ſo expert, as to be able to take any quantity of blood by it that can ever be neceſſary.

In ſome caſes of local pains, and in others where ſuppuration of the part has been wiſhed for, an operation termed *dry cupping* has been propoſed, and in ſome inſtances its advantages are ſaid to have proved conſiderable. This conſiſts in the application of the cupping glaſſes directly to the parts affected, without the uſe of the ſcarificator. By this means a tumor is produced upon the part; and where any advantage is to be expected from a determination of blood to a particular ſpot, it may probably be more eaſily accompliſhed by this means than by any other.

In Plate VI. are repreſented a ſcarificator, and different ſizes and figures of cupping glaſſes, with which every operator ought to be amply ſupplied, ſo as to be able to adapt a glaſs to every part from whence it may be proper to diſcharge blood in this manner. When the part from which it is intended to produce a

local

Plate V.

Fig. 1.

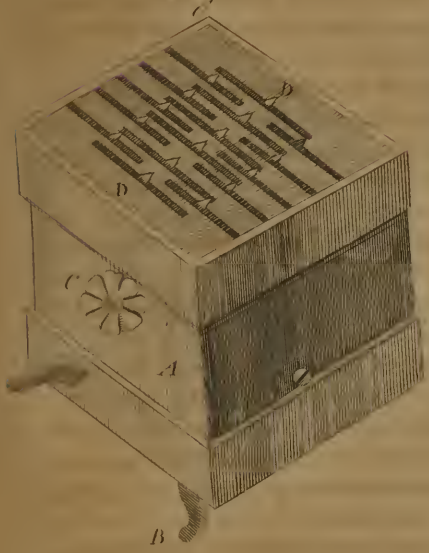


Fig. 2.

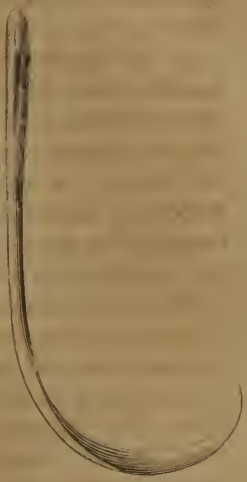


Fig. 4.

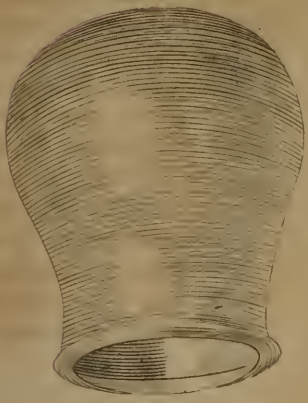
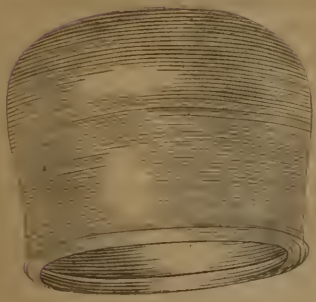


Fig. 3.



local evacuation of this kind is so situated that a scarificator and cupping glasses can be applied, this method is greatly preferable to every other; but it now and then happens, that parts are so situated as not to admit of their application: Thus, in inflammatory affections of the eye, of the nose, and of other parts of the face, the scarificator cannot be properly applied directly to the parts affected. In such instances, leeches are commonly had recourse to, as they can be placed upon almost any spot from whence we would wish to discharge blood.

In the application of these animals the most effectual method of making them fix upon a particular spot, is to confine them to the part by means of a small wine glass. Allowing them to creep upon a dry cloth, or upon a dry board, for a few minutes before application, makes them fix more readily; and moistening the parts on which they are intended to fix, either with milk, cream, or blood, tends also to cause them to adhere much more speedily than they otherwise would do. So soon as the leeches have separated, the ordinary method of promoting the discharge of blood, is to cover the parts with linen cloths wet in warm water: In some situations, this may probably be as effectual a method as any other; but wherever the cupping glasses can be applied over the wounds, they answer the purpose much more effectually: Wherever the figure of the part, therefore, will admit of their application, they ought undoubtedly to be employed.

Among other methods of effecting what we term Local Bloodletting, scarifications with the edge or shoulders of a lancet was mentioned as one: There are not many instances in which this proves very necessary; but now and then cases do occur in which blood may be taken in this manner, when it cannot with propriety be discharged by any other means. This is particularly the case in some inflammatory affections of the eye, where the ball of the eye is chiefly affected, and

where

where general bloodletting and evacuations from the neighbouring parts do not prove effectual. In ſuch affections it frequently happens, that ſcarifying the veſſels of the tunica conjunctiva of the eye, ſo as to evacuate perhaps only a very few drops of blood, is productive of much advantage. The mere diviſion of the veſſels in ſuch caſes, has indeed been ſuppoſed to be of uſe; but I have conſtantly obſerved, that the advantage produced by this operation, has been in general nearly in proportion to the quantity of blood diſcharged by it.

Different methods have been propoſed for performing it, but the eaſieſt and moſt effectual, is by means of the edge or ſhoulder of a lancet. For this purpoſe, the upper eyelid being ſupported by the hand of an aſſiſtant, and the under palpebra being ſecured by the fingers of the operator's left hand, with the lancet in his right hand, a number of ſlight ſcarifications ſhould be made through the different veſſels that ſeem to be moſt turgid. In order to ſecure the eye properly, it has been adviſed to have it previouſly fixed by a ſpeculum before attemping to ſcarify the veſſels. There is not, however, any occaſion for this precaution, as the eye may be always made ſufficiently ſteady for this operation, by gentle preſſure with the fingers in the manner directed; and beſides, in this inflamed ſtate of the eye, the preſſure produced by a ſpeculum is very apt to do miſchief.

To ſuch as have not ſeen this operation put in practice, it may perhaps appear to be too hazardous to be attempted by thoſe who are not much accuſtomed to it; but a very moderate degree of ſteadineſs renders it very eaſily and ſafely practicable. All the veſſels intended to be cut, being freely divided, bathing the eye in warm water is the moſt effectual method of encouraging the diſcharge.

In the ſame manner, ſcarifications of this kind may at times be uſefully employed in removing inflammatory

matory affections of the eyelids; and the ſame remedy may now and then, perhaps, be uſed with advantage in ſimilar affections of other parts.

Among other methods that have been propoſed for ſcarifying the blood veſſels of the eye the beards of rough barley were at one period much extolled, and are ſtill employed by ſome individuals. By drawing them over the ſurface of the eye, in a direction contrary to the ſharp ſpiculæ with which they are furniſhed, a conſiderable diſcharge of blood is thereby produced. But the pain attending this operation is exquiſite; and as it does not poſſeſs any ſuperior advantage to the method with the lancet, it is now falling into general diſuſe.

We have thus finiſhed the conſideration of the various means employed in ſurgery for evacuating blood from the ſyſtem; and as the diſorder termed Aneuriſm is frequently produced by an unguarded manner of performing one of the operations we have juſt been deſcribing, the farther conſideration of this ſubject cannot, we think, be any where more properly introduced than in this place, where one of the principal cauſes tending to produce it has been ſo lately treated of.

CHAP.

CHAP. IV.

OF ANEURISMS.

SECTION I.

General Remarks *on* Aneurisms.

THE term Aneuriſm, was originally meant to ſignify a tumor formed by the dilatation of the coats of an artery; but by modern practitioners, it is made to apply not only to tumors of this kind, but to ſuch as are formed by blood effuſed from arteries into the contiguous parts; a circumſtance which may happen either from an artery being punctured with a ſharp inſtrument, or from a rupture of its coats produced by any other cauſe.

The firſt ſpecies of the diſorder, viz. that which depends on the extenſion or dilatation of the coats of an artery, has been denominated the True Aneuriſm; and the latter, or that which proceeds from an effuſion of arterial blood into the ſurrounding parts, has been commonly termed the Falſe Aneuriſm.

As the introduction of new appellations frequently tends to produce confuſion, neceſſity alone can juſtify the attempt; and accordingly it will rarely happen in the courſe of the preſent work, that any innovation of this kind is made. In the preſent inſtance, however, as the nature and treatment of the diſorder may be rendered more clear and diſtinct by a change of terms applied to the different ſpecies of aneuriſm, an attempt

of

of this kind may, for such a reason, it is hoped, be made without any impropriety.

In that species of the disorder depending upon the dilatation of an artery, as the tumor is always circumscribed, and contained within coats peculiar to itself, it may therefore properly enough be termed the Encysted Aneurism; and the other, from the swelling spreading extensively over the neighbouring parts, may with equal propriety be termed the Diffused Aneurism.

As these two species of the disorder are very different from one another, not only in their causes, appearance, and effects, but even in the treatment necessary for their removal; it will be proper, therefore, to enter into a separate consideration of each of them.

In the true or encysted aneurism, when externally situated, the tumor when first observed is commonly very small and circumscribed; the skin retains its natural appearance; when pressed by the fingers, a pulsation corresponding with that of the artery below is evidently distinguished; and with very little force the contents of the swelling, while they are yet soft and fluctuating, may be easily made to disappear entirely.

If means properly calculated for the removal of the disease are not now put in practice, or if upon trial they should be found to fail, the swelling begins to increase, becomes more prominent, and continues in a gradual manner to acquire a larger size. For a considerable time the skin and teguments retain their natural appearance; the patient does not complain of pain, not even on pressure; the tumor continues of an equal softness; and its contents are still compressible, yielding considerably, and in general disappearing entirely on the application of pressure. At last, however, when the swelling becomes very large, the skin loses its ordinary colour, becomes pale, and, in the more advanced stages of the disease, even œdematous: The pulsation still continues; but the tumor

although ſoft in ſome parts, yet in others is firm, and cannot now be made to yield much upon preſſure, part of the contained blood having in this ſtage of the diſeaſe become hard by coagulation.

The ſwelling continuing to increaſe, in a gradual manner it becomes more painful, and produces much diſtreſs ; the ſkin turns livid, apparently verging to a gangrenous ſtate : At laſt, an oozing of bloody ſerum occurs from the teguments ; and if a real mortification does not take place, the ſkin cracks in different parts ; and now the force of the artery not meeting with ſo much reſiſtance as before, in a very ſhort ſpace of time, if the veſſel is large, a period is put to the patient's exiſtence, by the blood burſting out with ſuch violence as to produce almoſt inſtantaneous death ; at leaſt in the larger arteries of the trunk of the body, this is the ordinary event of all ſuch affections. In the extremities, however, the arteries are not ſo large as by their rupture to be capable of producing effects ſo immediately fatal ; and beſides, we can here, in general, by means of the tourniquet, be always certain of preventing this ſudden termination of the diſeaſe.

In aneuriſmal affections of the larger arteries, the effects produced upon the neighbouring parts, by the conſtant pulſation and gradual augmentation of the tumor, are often ſurpriſing. The ſofter parts we might, *à priori*, expect to yield to a very conſiderable extent ; but the hardeſt parts of the body, probably from the very circumſtance of their *not being capable of yielding*, evidently ſuffer more from the effects of this kind of preſſure, than either membranes, muſcles, or ligaments. Even the bones frequently undergo a very great degree of derangement, by the pulſation and diſtenſion of contiguous aneuriſms : Sometimes they are ſeparated entirely from one another at the different joints : On ſome occaſions they are elevated much out of their natural ſituations ; and in many inſtances they have been found entirely diſſolved.

Occurrences

Occurrences of this kind are not common in any of the extremities, as it is the strong pulsation of the aorta only, or of some of the larger arteries at no great distance from the heart, that we can ever suppose should be followed by such consequences. Now and then, however, similar effects of an aneurism have been observed in the thigh, and superior parts of the arm; even the bones of these parts having been found much affected by aneurismal swellings of the neighbouring arteries.

The appearance and termination of encysted aneurisms, are in general very nearly as is here represented: One exception, however, occurs in a particular species of the disorder, which will afterwards be more accurately described.

Various causes may be supposed necessary to the production of encysted aneurisms. 1. We know from daily experience, that partial debility frequently occurs in different parts of the system: Thus, there is nothing more common than œdematous swellings of the extremities, even in constitutions otherwise healthy; and swellings of this nature, we justly suppose to depend most frequently on a local weakness of the parts in which they occur. Now, why may not a debility of a similar kind fall upon part of the arterial system? And, if it should ever do so, we can easily see how in almost every instance it must necessarily terminate in aneurismal swellings: For the force of the heart continuing the same, if any particular part of an artery has lost its tone, as it is thereby rendered incapable of resisting the pulsations of the heart, a yielding or dilatation of its coats, must at these weakened parts naturally ensue; and as soon as a morbid enlargement of its cavity is thus fairly commenced, as its power of resistance will of course proportionally diminish, while at the same time the *vis à tergo* still continues equally powerful, the farther increase of the swelling is a consequence that must necessarily ensue.

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This cause of the disease may be considered as the most frequent origin of aneurisms that do not evidently depend upon external injuries: All such swellings as occur in the course of the aorta, seem clearly to depend on this cause; as is in general the case, indeed, with all such as happen internally, in whatever part of the body they may be situated.

2. The external coats of an artery being destroyed by a wound with any kind of instrument, a partial weakness of the part will be thus produced; and this must render it liable to be acted upon to advantage, by the heart and other parts of the arterial system, in the same manner as if it had been previously debilitated by disease.

In dilatations of an artery produced by this cause, the disorder proceeds in the manner we have already described. The blood, from being still confined within the coats of the artery, continues to form a circumscribed tumor. In the beginning of the disease, the swelling is easily made to disappear upon pressure; but on advancing farther, part of its contents become so firm by coagulation, as to render it impossible to discuss it by any degree of pressure that can with propriety be applied. This species of the disorder may now and then occur from other causes, but it is most frequently produced by bloodletting in the arm; by the lancet, after having passed through the vein, going so deep as to divide the external coats of the artery.

3. A similar effect has been sometimes produced, by the matter contained in neighbouring sores and abscesses, proving so corrosive as to destroy the external coverings of the contiguous arteries: When this happens to occur, the same train of symptoms, it is evident, must succeed as if the outer coats of the vessel had been destroyed by a lancet or any other sharp instrument.

4. The bones, muscles, ligaments, &c. with which arteries are surrounded, all serve as a support to these vessels,

vessels, so that it is not surprising, that the destruction of any of these parts should tend to the production of aneurisms; and accordingly instances have occurred, where affections of this kind seemed evidently to depend on such a cause: Indeed the firmness and stability of any set of parts naturally connected together, depends so much upon a sound state of the whole, that any one of them becoming weak and diseased, generally terminates in a diseased state of all or part of the remainder. In the thigh of a patient where part of the muscles and other soft parts had been destroyed by an extensive mortification, different aneurismal swellings occurred in the course of the femoral artery which had thus lost part of its support; and no other cause appeared to be concerned in their production.

5. In bloodletting at the usual place in the arm, it was already remarked, that arteries are sometimes wounded, by the lancet passing quite through the vein into the artery below; and when the artery happens to be directly in contact with the vein, the blood discharged from the orifice made in the artery, by passing directly into the vein, serves to keep up a communication between the trunk of the one, and a principal branch of the other.

In this manner, a direct passage being produced between the artery and vein, and the coats of the latter not being sufficiently firm for resisting the impulse of the former, a preternatural dilatation of the vein is a consequence that must necessarily follow: A tumor accordingly is very soon produced, which is at first small and circumscribed, but by degrees it extends considerably both above and below the orifice; not only along the course of the vein originally wounded, but, on some occasions, all the veins lying contiguous come to be equally distended.

This species of the disease was first accurately described by that celebrated anatomist Doctor William Hunter; and may with great propriety be termed the

Varicose

Varicose Aneurism. Since that period it has been frequently observed by different practitioners; so that its nature is now very generally understood.

Although the coats of the artery are here supposed to be all cut fairly open, so as to produce an immediate discharge of blood; yet by the blood being contained within the cavity of the veins, this species of the disease may with equal propriety be considered as encysted as any of the preceding; and as the treatment of it coincides much with that of other encysted aneurisms, the farther consideration of the subject could not, it was imagined, be any where more properly introduced.

In this species of aneurism, the swelling is confined entirely to the veins. Soon after the injury producing it has been received, the vein communicating immediately with the artery begins to swell: In a gradual manner, this enlargement becomes more remarkable; and when any considerable anastomosis occurs near to the part affected, between it and the contiguous veins, these also become much enlarged. By pressing upon this swelling of the veins, it may be made to disappear entirely, the blood contained in them being in part pushed forward in its course towards the heart, while part of it may possibly be forced into the artery itself; and, when the tumor happens to be of a considerable size, the blood, when it is thus forced out of it, is heard to make a very singular hissing kind of noise. This, when it occurs, is a very characteristic symptom of the disease; but as it is not met with in every case, it becomes necessary to point out particularly, such circumstances as more certainly serve to distinguish this species of aneurism.

In the varicose aneurism there is a very singular tremulous motion discovered in the dilated vein, attended with a perpetual hissing noise as if air was passing into it through a small aperture.. If a firm ligature be applied upon the under part of the limb, immediately

mediately below the swelling, and be tied so tight, as even to stop the pulse in the under part of the member, the swelling in the veins, on being removed by pressure, returns instantaneously on the pressure being taken off, and does not appear to be in any degree affected by the ligature below; which it undoubtedly would be, was it not for the direct communication between the trunk of the artery and corresponding vein. The swelling being removed by pressing the blood forward to the heart, and a slight pressure being made with the point of the finger on the orifice in the artery, the veins remain perfectly flaccid, without any swelling whatever being produced, until the pressure is removed from the orifice, when they fill again immediately; and this even happens, although the pressure on the artery is not so firm as to stop the circulation in the under part of the limb.

In the same manner, too, if the trunk of the artery be compressed above the orifice, so as to stop the circulation effectually, that tremulous motion and hissing noise in the swelling of the veins ceases instantly; and, if the veins are now emptied by pressure, they will certainly remain so till the compression upon the artery is removed. On some occasions, too, it happens, that if two ligatures be applied, one an inch or two above, and the other as much below the swelling, and are made so tight, as to stop entirely the circulation of the blood in the tumor lying between them; if the swelling is now compressed, all the blood contained in it is made to pass into the opening in the artery, from whence it instantly returns again on the pressure being removed. This, however, does not always happen; and its not doing so, is no proof whatever of that species of aneurism now under consideration not actually existing; for if all or several of the leading circumstances of the disease which we have just enumerated ever take place, the nature of the disorder is thereby rendered clear and evident.

In

In addition to the other characteristic symptoms of the varicose aneurism, it may be remarked, that when it has continued for any length of time, so as to have produced a considerable dilatation of the veins, the trunk of the artery above the orifice generally becomes preternaturally large, while the branches below become proportionally small; and of consequence, the pulse in the under part of the member is always more feeble than in the sound limb of the opposite side.

The reason of this last circumstance is obviously this; that the blood, by finding a direct passage between the trunk of the artery and the principal branch of the corresponding vein, passes more readily in that way, than by the common course of circulation along the under part of the member; so that the quantity of blood sent to the inferior extremities of the artery being thus much diminished, the pulsation produced by it must of course become proportionally feeble: But why the superior part of the artery should be enlarged, by the blood passing thus so directly and easily from it into the vein, is a circumstance not so easily accounted for. The resistance to the blood passing through the artery, is by this direct communication between it and the vein very much diminished; and this has been suggested as the cause of the phenomenon. But this circumstance, of the resistance to the passage of the blood being thus diminished, we might more readily expect to have a very contrary effect. In other parts of the circulating system, we frequently find, that resistance to the passage of the fluids terminates in a dilatation of the containing vessels; and that swellings thus produced, can be removed by no other means than the removal of that resistance which first gave rise to them. Nothing that can be said upon this subject, however, will afford much satisfaction, as it is merely a speculative point; and as it can have no great influence on the practical treatment

ment of the disorder, we shall not here attempt a farther investigation of it.

Having thus enumerated the ordinary appearances of the different species of encysted aneurism, together with the various causes which are found to produce them, we shall now proceed to describe the symptoms and causes of the diffused aneurism, and shall conclude with the treatment of the various species of the disease.

The Diffused, or what is commonly termed the False Aneurism, consists in a wound or rupture of an artery, producing, by the blood thrown out from it, a swelling, more or less diffused, in the contiguous parts.

Great bodily exertion has frequently proved an evident means of inducing a rupture of very considerable arteries seated internally: This we know to be particularly frequent in those of the lungs, probably from their being in that organ surrounded with such soft contiguous parts as do not afford them much support; and probably from the contrary reason, that here the arteries are more firmly supported, such accidents seldom or never occur in the external parts, where alone they could ever become the object of a surgeon's attention. We shall therefore confine our description of this disorder, entirely to that kind of it which we know to be most frequently produced by a wound made directly into an artery, and which it is commonly in the power of art to relieve.

When treating of the consequences of venæsection in the arm, wounding the contiguous artery was particularly mentioned as one: In a few instances, by the treatment then pointed out, any bad effects which might otherwise occur from this circumstance, will be entirely prevented by the wound in the artery healing without any of the usual consequences being produced by it. Such happy terminations, however, of this accident, are exceedingly rare, and can never with any degree of certainty be depended on.

When a punctured artery resists the means employed for preventing the ordinary effects known to result from it, it will then for certain terminate in a swelling of the aneurismal kind; and the following is the usual progress of the disorder.

A small tumor, of about the size of a horse bean, generally rises just at the orifice in the artery, soon after the discharge of blood has been stopt by compression: At first the tumor is soft, has a strong degree of pulsation, and yields a little upon pressure. It is never, however, so compressible as the swelling of an encysted aneurism: For in the latter, except in the more advanced stages of the disease, the blood remains perfectly fluid, and there is a regular circulation of it through the whole cyst; whereas, in the diffused aneurism, the blood forming the tumor is at once extravasated; and as in that state it soon begins to coagulate, it is not long in acquiring a very firm degree of consistence.

In this state of the disorder, if the swelling be not improperly treated by the application of much pressure, it generally remains nearly of the same size for several weeks, when it begins gradually to increase; and if seated in the usual place of bloodletting in the arm, it proceeds rather farther up than the orifice, and extends rather more inwardly than towards the outer part of the arm, probably from the expansion of the biceps muscle not being there so firm and compact as in the external and under part of the arm. This enlargement of the tumor, too, proceeds with much more quickness in some instances than in others, and on some occasions the swelling is much more diffused and extended than in others.

Both these circumstances, it is probable, depend upon the same cause. If the blood poured out by an artery, is thrown into a very lax cellular substance, we can easily suppose, that its increase will not only be more rapid, but that the diffusion of the tumor must

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for the same reason be much more considerable, than when the artery is immediately enveloped by firm membranous or ligamentous parts, which do not so readily yield to the impulse of the blood. There is, from this circumstance alone indeed, such a remarkable difference in the progress of the disorder, that in some instances swellings of this kind have been many months, nay even years, in arriving at any considerable size; and on the contrary, some instances have occurred of the blood from the orifice in the artery, being diffused over the whole arm from the elbow up to the shoulder in the space of a few hours from the operation.

A particular laxity of cellular substance, has undoubtedly, in all such instances, a great influence in promoting this rapid diffusion of the extravasated blood; but the ordinary practice in every case of a wounded artery, of applying very tight compression, I am convinced, has also a very great influence in producing the same effect. In addition to what was said upon this point in the chapter on Bloodletting, I shall here just observe, that if it was possible to produce a moderate degree of pressure upon the orifice in the artery alone, some advantage might now and then perhaps be derived from it; but in order to apply a degree of compression sufficient for producing any influence upon the artery, the principal veins in the limb must by the same means be all so much acted upon, as to occasion much obstruction to the return of blood from the corresponding artery. And whatever tends in any degree to obstruct the refluent blood, must in an equal proportion distend the wounded artery, and increase the quantity of blood which escapes by the orifice. Many machines have indeed been contrived for producing a partial compression upon the artery without affecting the rest of the limb: But however much these may have been extolled by their several inventors, yet none hitherto discovered

answers

answers the purpose of compressing the artery, without at the same time tending greatly to obstruct the circulation in the veins; insomuch that a great deal of mischief has on different occasions been produced by all of them.

Whoever inclines to have recourse to the use of these instruments, will find a variety of them delineated in Heister's System of Surgery, and in Dionis and Platner's works.

Mr. Dionis, an eminent French surgeon, although in cases of wounded arteries he recommends the usual practice of compression, yet relates a case which happened to a surgeon of his acquaintance, in which the bad effects produced by it were so strongly marked, as must convince any person of the general impropriety of such a remedy.

A surgeon having in bloodletting opened an artery, the usual method of tight compression was immediately employed. By this means the discharge of blood externally was very soon stopped: But some blood continuing to escape from the orifice in the artery, passed up towards the superior part of the arm, which it filled to such a degree, that on the operation for the aneurism, which was soon found necessary, being performed, upwards of four pounds of coagulated blood was discharged from it; and for this purpose it became necessary to lay the parts open along the whole course of the arm.*

When, again, compression has not been applied to such tumors, unless there is a very unusual degree of softness and laxity in the surrounding parts, the swelling proceeds to increase in a more gradual manner: As it becomes larger, it does not, like the true aneurism, become much more prominent, but rather spreads and diffuses itself into the surrounding parts: By degrees it acquires a very firm consistence; and the pulsation, which was at first considerable, always diminishes

* Vid. Dionis's Course of Chirurgical Operations.

minishes in proportion to this difference of consistence, and to the increase which the tumor receives in point of size; insomuch, that in large aneurismal swellings of this kind, it sometimes happens, that the pulsation of the artery is scarcely perceptible.

In the first stages of the tumor, if the blood thrown out from the artery lies very deep, the skin preserves its natural appearance, and does not change its colour till the disorder is much advanced. It frequently happens, however, that the blood is at first thrown out with so much violence, as to get into immediate contact with the skin; and when this occurs, the colour of the parts becomes instantly livid, as if tending to a state of mortification. A real sphacelus, indeed, has on some occasions been induced where the extravasation of blood has been considerable, and where the means best suited for its removal have either failed or have been entirely neglected.

It must be considered, however, as a piece of unpardonable negligence, in any practitioner, to allow a patient, from this cause, to run that degree of risk which always attends mortification; for the hazard attending the operation of the aneurism, is in general trifling when compared with the danger accruing from an extensive gangrene.

As the tumor in this species of the disease proceeds to increase, the patient, who during the first stages of it did not complain of much uneasiness, is now much distressed not only with severe pains, but with stiffness, want of feeling, and immobility of the whole member: And these symptoms, continuing to augment, if the tumor is not previously operated upon, the teguments at last burst; and if the artery is of any considerable size, and if we have not immediate recourse to effectual means for preventing it, death must for certain ensue, in consequence of the very profuse hemorrhagy which must thus be produced.

Various

Various causes were enumerated, as being frequently under certain circumstances productive of the encysted aneurism; some variety occurs too of causes which terminate in the diffused species of aneurism.

I. Violent bodily exertions may be considered as the most frequent cause of the rupture of arteries situated internally; but as these do not properly belong to a work of surgery, we shall not here enter at any length into their consideration.

II. The corrosive matter of sores and abscesses, by entirely destroying the coats of a contiguous artery, may in this manner be productive of the diffused aneurism.

III. The sharp spiculæ of a fractured bone being pushed into a neighbouring artery, have, on different occasions, produced aneurism.

IV. Violent blows have been known to produce aneurismal swellings of this kind. This, however, can scarcely happen in any other situation than on the head, where the arteries lie more exposed than in other parts to the effects of such injuries, by their being here very thinly covered, and from a blow in this situation acting with great advantage, by falling on the artery lying almost in close contact with a firm hard body, the cranium.

V. If the arterial covering of an *encysted* aneurism, should ever burst before the external teguments of the tumor, in that case the blood contained in it would diffuse itself into the contiguous parts; and in such an event, the disease would no doubt become a real *diffused* aneurism. Such an occurrence, however, we have reason to think, very rarely, if ever happens; for, instead of the *internal* coverings of such tumors first breaking, so far at least as I have had opportunities of observing, it is the very reverse. The swelling going on to increase in a gradual manner, the teguments at last become so tense and overstretched, that they lose their tone entirely; the skin becomes soft and œdematous;

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on some occasions, it comes into a gangrenous state; and on others, although it retains its natural white colour, yet its usual powers are as evidently destroyed as they ever are in the last stage of mortification. In this state it generally remains for a longer or shorter space of time, according to the strength of the arterial pulsation below. At last, however, the skin begins to crack, and a thin serum oozes out; the edges of this small fissure in the teguments gradually separate from one another; and the contents of the tumor having lost a considerable part of their support, the force with which they are impelled, by degrees becomes too powerful for the remaining coverings, which accordingly soon burst, so as to discharge their contents externally, without producing any effusion among the neighbouring parts.

I should therefore suspect, that authors in general have all along been under some mistake on this point: The Encysted, or True Aneurism, as it is termed, has been always supposed in its last stages to burst internally, and so to produce the diffused or false species of the disease; from what has been said, however, there is good reason to presume, if ever it does happen, that it is at least a very rare occurrence. The progress and termination of the encysted aneurism, in every case I have either seen, or known well authenticated, has been very nearly as we have just described; not by the arterial sac first bursting, but by a rupture being produced in the external teguments after they have been greatly overstretched; the blood being soon thereafter discharged outwardly, without producing any effusion into the surrounding parts. As it has been alleged, however, by very respectable authors, that the contrary does now and then happen, and as there is a possibility of this being the case, I could not here avoid considering it as one of the causes of diffused aneurism.

VI. The most frequent cause, however, of this species of aneurism, are punctures with sharp instruments, such

ſuch as ſwords, cutlaſſes, and particularly the lancet; which laſt may be conſidered as having been productive of at leaſt nine tenths of all the aneuriſmal ſwellings that ever occurred.

Under one or other of theſe heads, almoſt every circumſtance may be comprehended, that can ever tend to the production of ſuch affections.

On many occaſions, it has unfortunately happened, that tumors of the aneuriſmal kind having been miſtaken for abſceſſes and other collections of matter, their contents of courſe have been laid open by inciſion. The conſequences of ſuch practice, may be more readily conceived than deſcribed. With a view to prevent ſuch dreadful occurrences, it would be a matter of very great importance to practitioners, to have ſuch a ſet of diagnoſtic ſymptoms of aneuriſm pointed out, as would with certainty determine the nature of the complaint. In the commencement of the diſorder, there is in general no great difficulty in determining, as the pulſation in the tumor is commonly ſo ſtrong, and other concomitant circumſtances tend ſo obviouſly to point out the nature of the diſeaſe, that little or no doubt reſpecting it can ever occur; but, in the more advanced ſtages of the diſeaſe, when the ſwelling has become very large, and has loſt its pulſation entirely, nothing but a very minute attention to the previous hiſtory of the caſe can enable us to form a judgment of its nature.

Thoſe ſwellings, with which aneuriſms are moſt likely to be confounded, are, ſoft encyſted tumors, ſcrophulous ſwellings, and abſceſſes containing either purulent or other matter, ſituated either immediately above, or ſo nearly in contact with an artery, as to receive the influence of its pulſation; and when any ſuch tumor happens to be nearly connected with an artery of conſiderable ſize, the pulſation communicated to it is frequently found to be ſo very ſtrong and diſtinct, as to render it impoſſible from this circumſtance

stance alone, to form any just idea as to the nature of its contents.

But there is one symptom which, when present, and when connected with a strong pulsation in the tumor, may always lead us to determine with a great degree of certainty, that the swelling is of the aneurismal kind; and it is this; the contents of the tumor being made easily to disappear upon pressure, at the same time that they return instantaneously on the compression being removed. But although the *presence* of this circumstance, when connected with other characteristic symptoms of aneurism, may lead us to conclude, that every tumor *is of that nature* in which these happen to be combined, yet the *want* of it ought by no means to convince us that it is *not* of that kind; for it very frequently happens, particularly in the advanced stages of aneurisms, that their contents become so firm and compact that no effect whatever is produced upon them by pressure. Upon the whole, therefore, as in many instances of this disease, no certainty whatever can be obtained as to its real nature, in all such cases where there is any considerable degree of doubt, practitioners ought to lay it down as an established rule, to proceed as if the tumor was in reality of the aneurismal kind. By adhering to this rule, they may perhaps in a few instances be deterred from opening tumors of an ordinary nature, which they may afterwards find might have been laid open with safety; but any lesser inconvenience that may thus be occasioned, will be much more than compensated, if, even in a single instance, a surgeon be saved from those disagreeable reflections which he must experience if he should have the misfortune to open an aneurism instead of a collection of matter.

But it is in the trunk of the body only, it must be observed, or in the neck, axilla, upper part of the thigh, or groin, that so much caution in the treatment of tumors of this doubtful nature can be ever neces-

ſary. For when ſituated on the under part of any of the extremities, or even on any acceſſible part of the head, as in ſuch caſes, when the ſwellings have proceeded to any conſiderable ſize, the operation for the aneuriſm ought always to be performed, ſo there can never in ſuch circumſtances be any impropriety in having recourſe to it; for if, on laying the tumor open, it is found to be of the aneuriſmal kind, we are poſſeſſed of a very certain method of ſaving the patient from immediate danger, namely, the application of the tourniquet.

In forming a prognoſis in caſes of aneuriſm, three important circumſtances chiefly require our attention. The manner in which the diſeaſe appears to have been produced: The part of the body in which the ſwelling is ſituated: And laſtly, the age, and habit of body, of the patient.

If an aneuriſm has come forward in a gradual manner, without any apparent injury having been done to the part, and without having ſucceeded to any violent bodily exertion; there will then be great reaſon to ſuppoſe, that the diſeaſe depends upon ſome paralytic or other general affection either of the trunk of the veſſel in which it occurs, or perhaps of the whole arterial ſyſtem; ſo that no great ſucceſs is to be expected from any means to be attempted for the patient's relief; for the operation of the aneuriſm being performed on the part affected, there would be much reaſon to ſuſpect that the ſame cauſe which originally produced it here will have the effect of producing ſimilar dilatations in other parts of the artery: Whereas, there is great reaſon to expect, if the tumor has evidently ſucceeded to a bruiſe, puncture, or other external accident, that the operation will be attended with complete ſucceſs, provided the circulation of the part is not altogether deſtroyed by the ligature to be put upon the artery.

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In that species of the disorder we have termed the Varicose Aneurism, we may generally venture on a more favourable prognosis than in any other kind of aneurism: For it has been found in different instances, that the aneurismal tumor does not here proceed so rapidly as in other cases; that as soon as it gets to a certain length, it does not afterwards acquire much additional size; and that any inconvenience produced by it may be sustained with tolerable ease for a great number of years.

It is in this circumstance alone, we must observe, that any advantage occurs in the treatment of aneurisms from Dr. Hunter's discovery of this species of the disease: And a very important discovery it is; for by means of it, a patient may be saved, not only from a very painful operation, but from that great degree of risk which must always attend the destruction of the principal artery of a limb. In the event of a swelling of this nature arriving at such a size as to produce much real distress, the operation ought no doubt to be had recourse to; but, so long as any inconvenience arising from it can be easily submitted to, the hazard which almost always attends this operation, and which nothing but necessity ought to indicate, should certainly be avoided*.

The

* In Volume II. Art. XXXVI, of London Medical Observations, two cases are related of the varicose aneurism, by Dr. Hunter. One of them at that time was of fourteen years standing, and the other had subsisted for five years, without being productive of any necessity for having recourse to the operation. And in Vol. III, of the same work, Art. XIII, a similar case of five years duration is related by Dr. Cleghorn.

As it has been alleged by some practitioners, that no advantage results from the discovery of this species of aneurism, from their supposing that the usual operation is as necessary in it as in any other variety of the disease; and as in different instances the operation has been put in practice even in the incipient stages of the disorder, where no real necessity we think could occur for it; it therefore becomes a matter of such importance as to merit a very attentive examination; and it is with much satisfaction that I communicate the following facts, as they tend to establish as a certainty, that in the varicose aneurism, the usual operation of obliterating the cavity of the artery, is seldom, if ever, necessary.

In

The situation of the tumor is the next circumstance of importance requiring our attention. When an aneurismal swelling is so situated, that no ligature or effectual compression can be applied for putting a stop to the circulation in the part, if the artery be large, there would be the utmost hazard in opening it; as the patient, in all probability, would lose more blood than his strength could bear, before the artery could be secured. In aneurisms so situated, therefore, particularly on any part of the trunk of the body, on the neck, axilla, or groin, there can never be any good foundation for a favourable prognosis. On the contrary, indeed, in such situations, the greatest danger is always to be apprehended: For the force of the arterial pulsation will at last certainly overcome the resistance of the coats with which the tumor is surrounded; and in such an event, the most fatal consequences are to be apprehended.

In the upper parts of any of the extremities, too, where

In a letter I am favoured with from Dr. Hunter, he says, "The Lady in whom I first observed the varicose aneurism is now living at Bath in good health; and the arm is in no sense worse, although it is now thirty five years since she received the injury." And the Doctor farther observes, that he never heard of the operation being performed for the varicose aneurism that was known to be such.

In a letter from Dr. William Cleghorn of Dublin, I am informed, that the case of varicose aneurism abovementioned, as related in the 3d Volume of London Medical Observations, remains nearly in the same state as at the time that account of it was made out, which was at least twenty years ago; only that the veins are rather more enlarged. The patient recovered, and the limb became nearly as strong and serviceable as the other. The man has all along continued his business of shoemaker, and has lately recovered from a sprain in the affected arm, which he received in lifting a heavy burden.

In a letter from Mr. Pott, whose opportunities for observation are great, he says that he has met with three different instances of this species of aneurism, and that the operation never became necessary in any of them.

Among other instances of varicose aneurism which have appeared here, a young man from Paisley, who had the misfortune to meet with it several years ago, was examined by different surgeons of this place. The disease was very clearly marked, and no operation was advised. In a letter from Mr. Hamilton professor of Anatomy in Glasgow, I am informed, that this man is now serving in the Navy, where he undergoes great fatigue without any inconvenience from the aneurism, although it is now of thirteen years standing.

where all the arteries of the limb are centred in one common trunk, the success of the operation for the aneurism must always be doubtful. But although this is undoubtedly the case in the superior parts of the extremities, yet in lower situations of the same parts, even the principal artery of the limb may be operated upon with a very fair prospect of success; for after the great artery of a member has crept along the upper part of it, a number of small branches are always sent out, which anastomozing not only with similar branches below, but by their means with the under part of the large artery itself, these, in the event of the common trunk from whence they sprung being destroyed, come to dilate to such an extent as to carry on the circulation in the inferior part of the limb much more completely than could *à priori* be expected. We would not naturally suppose, after the principal artery of a part has been obliterated, that the circulation would there be afterwards carried on with any tolerable degree of force; and yet numberless instances have occurred of the large brachial artery being completely destroyed by ligature, without being productive of much inconvenience to the parts below; and the same circumstance has also happened, where the operation for the aneurism has been performed on the trunk of the great femoral artery*.

From

* In one case, the operation for the aneurism was performed with the most complete success, on the trunk of the femoral artery, about two hand breadths from the groin, by the late Mr. Hamilton professor of Anatomy in Glasgow. And what rendered this case more remarkable, was, that after the trunk of the large artery was secured by the ligatures, it was necessary to perform the operation again upon a small branch of an artery which had been wounded, even farther up than the principal trunk.

For some time after the operation the limb remained colder than the other, and it was upwards of a week before any pulsation could be felt in the artery at the ankle. In two months from the operation, the wound was completely healed, and the circulation and heat returned; and in a short time thereafter the patient had so far recovered the use of his limb, as to be able to take very violent exercise.

These particulars I thought it right to communicate, as the case of this patient is one of a very few well authenticated instances, of this

From what has been ſaid, therefore, it muſt appear, that when an aneuriſm is ſo ſituated, that compreſſion cannot be applied ſo as to ſecure the patient from the loſs of much blood when the artery is laid open, the operation ſhould not be attempted; and in ſuch caſes the prognoſis ought certainly to be very unfavourable. And on the contrary, whenever an aneuriſm, produced by external violence, is ſeated on any of the extremities, where we are ſure of commanding the circulation, the operation ought always to be undertaken, as ſoon as, from appearances, there is the leaſt reaſon to ſuſpect that the tumor if left to itſelf might burſt ſo as to endanger the life of the patient.

The ſucceſs of this operation, depending in a great degree upon the probable chance there is for the circulation afterwards going on in the under part of the member, our prognoſis, in every caſe of aneuriſm, ought *cæteris paribus*, to be more or leſs favourable, according as the diſorder is ſeated higher or lower on the different extremities: For the riſk of the circulation being hurt by it, is always in proportion to the height of the tumor; according as it is higher or lower, this riſk is always increaſed or diminiſhed.

But laſtly, whether an aneuriſm has been produced by an external injury, or by the effects of internal diſeaſe, and whatever may be its ſituation, the habit of body and age of the patient ought to have a conſiderable influence, in determining the opinion of practitioners

this operation having been attempted on the femoral artery ſo near to its origin; and the ſucceſs attending it ſurely points out the propriety of having recourſe to the operation, in every aneuriſm of theſe parts that does not evidently ariſe from a general debility of the coats of the artery. And as I am favoured with this account of the caſe from the preſent profeſſor of Anatomy in Glaſgow, Mr. Hamilton, ſon to the late profeſſor, its authenticity may be depended on.

In Vol. III. Article XII, of the London Medical Obſervations, there is another inſtance related of the operation for the aneuriſm having been performed on the trunk of the femoral artery, by Mr. Burchal ſurgeon in Mancheſter; the patient recovered, and the limb became nearly as ſtrong and as ſerviceable as the other.

tioners as to the effects to be expected from the operation. In no operation, indeed, that we are acquainted with, are the advantages derived from health and youth more conspicuous than in this; for in the earlier periods of life, all the softer parts accommodate themselves much more readily to the circumstances attending any great change that may take place, than they ever do in the more advanced stages of life: In old age, all the animal fibres have acquired such a degree of firmness and solidity, as to be rendered almost incapable of distention; and this seems to be particularly the case with the arterial system, some parts of which are often known to proceed even to a state of ossification: So that at this period of life, we may readily suppose the smaller arteries to be rendered altogether incapable of that degree of distention necessary for supplying the want of the principal artery of a part, and which in the more early periods of life they might with great ease have admitted of.

This operation having been performed with various degrees of success, even where the aneurismal tumors were apparently in every respect similar both as to situation and other circumstances, various reasons have been suggested to account for this. With some the operation has succeeded, even under circumstances apparently more unfavourable, than with others where it failed. Thus it has been known to answer, as we have lately remarked, several inches above the knee, when the trunk of the femoral artery was for certain taken up by the ligature; and in others, it has failed when done in the ham: That is, in the former, the circulation in the under part of the leg was still preserved, and the patients recovered; while in the latter, where success might more readily have been expected, the limbs remained cold after the operation, no return of circulation took place, mortification at last was induced, and the patients died.

From

From this variety of success attending it, we find very contradictory opinions held forth respecting this operation. While one condemns it as being never productive of any good, except in the very extreme parts of a member; others assert, that even the largest artery of a limb may be operated upon with great probability of success.

This contrariety of opinion, however, may, I think, be easily explained, by what has been said above respecting the age and habit of body of those on whom the operation is performed; for, to the different powers of distention with which the arterial system is endowed at different periods of life, the good or bad success attending it may with sufficient reason be attributed: So that, although in an old infirm person, it may have been found to fail perhaps in the under part of the leg or arm, this should by no means deter us from having recourse to it, even in much higher situations, by patients that are young and healthy.

Having thus considered the usual appearances and causes of aneurism, together with the grounds upon which a just prognosis is to be formed, we shall now proceed to the method of cure.

SECTION II.

Of the Treatment *of* Aneurisms.

IN every case of aneurism the use of pressure has been indiscriminately recommended, not only in the incipient period of the disease, but even in its more advanced stages. In a former chapter on Bloodletting, as well as in some parts of this, different opportunities occurred for introducing the consideration of this subject: To these we must now refer; and shall at present attend to such points only as were not before so particularly entered into.

In

In the diffused or false aneurism pressure has been universally advised, not only with a view to dissipate the swelling already induced, but in order to produce a reunion of the wound in the artery: We have already made it appear, however, as pressure in such cases cannot be applied to the artery alone, without at the same time affecting the veins; and as this circumstance, by producing an increased resistance to the arterial pulsations, must undoubtedly force an additional quantity of blood to the orifice in the artery, that therefore no advantage is to be expected from it; but, on the contrary, that on many occasions there is reason to suppose it has been productive of bad consequences.

But although pressure ought never to be attempted in any period of the diffused aneurism, yet in some stages of the other species of the disease, it may be often applied with advantage.

In the early stages of encysted aneurism, while the blood can be yet pressed entirely out of the sac into the artery, it often happens, by the use of a bandage of soft and somewhat elastick materials, properly fitted to the part, that much may be done in preventing the swelling from receiving any degree of increase; and on some occasions, by the continued support thus given to the weakened artery, complete cures have been at last obtained. In all such cases, therefore, particularly in every instance of the varicose aneurism, which we have already endeavoured to show can very seldom require the usual operation, much advantage may be expected from moderate pressure.

But although pressure to a certain degree has frequently in cases of encysted aneurism proved very useful, it ought never to be carried to any great length; for tight bandages in all such affections, by producing an immoderate degree of reaction in the containing parts to which they are applied, instead of answering the purpose for which they were intended, have evidently

the contrary effect. Moderate compression, therefore, is more eligible than a great degree of it; and indeed the greatest length to which pressure in such cases ought to go, should be, to serve as an easy support to the parts affected, and no farther.

While at the same time we have recourse to this remedy of compression, other means ought not to be omitted: The patient should be kept upon a low diet; when necessary, some blood should be evacuated; the bowels should be kept lax; and all violent exercise, particularly of the part affected, should be carefully guarded against. In the latter stages of aneurism, when much tension and pain are induced, opiates are found very useful; and in many such ailments they are the only class of remedies from which any relief is obtained.

The treatment here recommended applies to every aneurism not intended to be operated upon; but it is particularly proper in all swellings of this kind situated on the trunk of the body and other parts where the operation is inadmissible. In such situations, indeed, an easy support by means of gentle compression, a low diet in order to prevent a plethorick state of the vessels; repeated bloodlettings when plethora actually exists; a total abstinence from exercise; and the use of opiates when indicated by pain; are the only remedies from which much benefit is to be expected.

Having thus pointed out the different remedies to be employed where the operation is either not considered as proper, or where it is rendered inadmissible by the situation of the swelling, we shall now proceed to describe the operation itself, on the supposition of its having become necessary, either when the means recommended for the previous treatment of the disorder have failed, or when the tumor has made too great progress before proper assistance was procured.

The first step in this operation ought to be, to obtain a full command of the circulation in the inferior

part

part of the member by means of the tourniquet applied above.

This being effected, the patient should be so placed, that the diseased limb, on being stretched on a table, is found to be of a proper height for the surgeon, who, as the operation is generally tedious, ought to be seated. The limb being in this situation properly secured by an assistant, the operator is now with a scalpel to make an incision through the skin and cellular substance, along the whole course of the tumor, and as it is a matter of much importance to have a sufficient command of space for the remaining parts of the operation, it is even of use to carry this external incision about half an inch both above and below the extremities of the swelling: No mischief can occur from the first incision being made very free and extensive; and I have seen different instances of the operator being much embarrassed in the subsequent steps of the operation, by too much timidity or perhaps ill judged lenity in this part of it.

This being done, the ordinary method is, to proceed in a very slow, cautious manner, dissecting away one layer of the membrane after another, till the artery itself is laid bare. In this manner the operation is always rendered exceedingly tedious, as the thickness of parts with which the artery is found covered, is often really astonishing, by one layer of a membranous substance having been formed after another, from the coagulable lymph of the blood contained in the tumor. In reality, however, there is no necessity for this degree of caution, as the operation may in the following manner be equally well performed, in a much shorter space of time, and with much less pain to the patient.

As soon as the external incision has been made in the manner directed, so as to divide the skin and cellular substance, all the effused blood ought to be wiped off by means of a sponge; and the softest part of the tumor being discovered, an opening ought there to be made

made into it with a lancet, large enough for admitting a finger of the operator's left hand. This being done, and the finger introduced into the cavity of the tumor, it is now to be laid open from one extremity to the other, by running a blunt pointed bistoury along the finger from below upwards, and afterwards from above downwards, so as to lay the whole cavity fairly open. In Plate VII, fig. 1, there is an exact representation of this bistoury, with a curve much less than usual, as a very slight concavity answers every purpose, and cuts more easily than a greater degree of curvature.

The cavity of the tumor being thus laid freely open, all the coagulated blood is now to be taken out: For which purpose, a number of instruments, particularly scoops, have been invented by different operators; but no instrument answers this intention so effectually, and with so much ease to the patient as the fingers of the operator; who having in this manner removed all the coagulated blood, together with those tough membranous filaments commonly found here, the cavity or the tumor is now to be made quite dry, and cleared of the blood which on the first opening of the swelling is discharged into it from the veins in the inferior part of the member; and this being effectually accomplished, the tourniquet must be made perfectly slack and easy, in order to discover not only the artery itself, but the opening into it from whence the blood collected in the tumor has been all along discharged. This being done, the next point to be determined, is, the manner of preventing any farther effusion of blood into the aneurismal sac. Various means have been proposed for accomplishing this; but the effects of all of them may be comprehended under the three following heads.

I. The effects of ligature upon a large artery, having in some instances occasioned the loss of the inferior part of the member, it was long ago proposed, that

that so soon as the opening into the artery has been discovered, instead of applying a ligature round it, which for certain is to obliterate its cavity entirely, a piece of agaric, vitriol, alum, or any other astringent substance, should be applied to the orifice, in order if possible to produce a reunion of its sides.

II. Upon the same principle with the preceding, viz. that of still preserving the circulation in the artery, it was several years ago proposed by an eminent surgeon of Newcastle, Mr. Lambert, that the orifice in the artery should be secured by means of the twisted suture. A small needle being pushed through the edges of the wound, they are then directed to be drawn together by a thread properly twisted round the needle, in the manner formerly advised when treating of sutures*.

Strong objections, however, occur to both of these methods. In the first place, no astringent application with which we are acquainted, is possessed of such powers as to deserve much confidence; for, although different articles of this kind have on various occasions proved a means of putting a temporary stop to hemorrhagies, yet there are very few instances properly authenticated, of their having produced any permanent advantage. In almost every instance in which they have been used, the hemorrhagy has recurred again and again, so as to prove very distressing, not only to the patient, but to the practitioner in attendance; so that from this want of success, little or no attention is now paid to remedies of this kind in ordinary practice.

With regard to Mr. Lambert's method of stitching the orifice in the artery, it is certainly a very ingenious proposal, and would in all probability, at least in most instances, prove an effectual stop to all farther discharge of blood; but as it has hitherto, at least so far as I have heard, been only attempted in one

* Vide London Medical Observations, Vol. II, Article XXX.

one instance, farther experience of its effects is necessary before it can with propriety be either rejected or approved. But if in such a matter reasoning may be indulged, we would beg leave to observe, that two material objections occur to this practice. One is, that in the operation for the aneurism, in almost every instance, a very few only excepted, the artery lies at the back part of the tumor; so that when all the collected blood is removed, there is such a depth of wound, that it must be always a very difficult matter, and on many occasions quite impracticable, to perform this nice operation upon the artery, with that attention and exactness, which, in order to insure success, it certainly requires. It has now and then happened indeed, that in this operation the artery has been found to be on the anterior part of the tumor, and in such a situation the wound in it would no doubt prove accessible enough. This, however, is a very rare occurrence, as in almost every instance of diffused aneurism the artery lies at the very bottom of the tumor, the blood being collected between it and the common teguments; and accordingly I have seen several instances of this disorder, in which, after the tumor was laid freely open, the artery was found to lie so deep as would have rendered it quite impossible to perform this operation.

But there is another very material objection which *à priori* evidently occurs to the practice recommended by Mr. Lambert. By introducing a needle through the sides of the orifice, and drawing these together by a ligature, the cavity of the artery must undoubtedly be at that point much diminished. Indeed Mr. Lambert, in his account of the case in which this operation was performed, acknowledges that the diameter of the artery was thereby diminished. Now, the passage of the blood being thus contracted at one point, the impulse upon that particular part must be very considerable: So that the very

remedy

remedy employed for the cure of one species of aneurism, will in all probability prove a very powerful agent in inducing another; for the blood being thus obstructed in its usual course, there will be no small danger incurred, of a dilatation being produced immediately above this preternatural stricture.

I must fairly acknowledge, however, that all I have advanced, proceeds from reasoning alone, and is not as yet supported by experience. But, if farther trials of this operation tend to show that the objections now stated against it are not well founded, no person whatever will be more ready than I shall be in adopting it; for, if these objections were removed, this operation, as proposed by Mr. Lambert, I should consider as deserving to be ranked among the most important improvements which in modern times surgery has acquired. In the treatment of aneurism by the common operation, if the principal artery of a limb is concerned, some risk is always incurred, not only of injuring the parts below in a most material manner, but even of destroying them entirely, by depriving them of the quantity of blood necessary for their support. Now, by Mr. Lambert's improvement, an effectual stop is put to the farther evacuation of blood, while at the same time the circulation in the diseased artery is still preserved; so that if farther experience of its effects shall show that the objections we have ventured to bring against it are not well founded, it will deservedly be admitted as a very material improvement in the treatment of this species of aneurism.

III. Neither of the methods we have yet been considering, being found eligible for securing the orifice in the artery, we shall now proceed to describe the ordinary manner of performing this operation, which consists in obliterating the arterial cavity entirely, by means of ligatures; and the method of doing it is this.

The artery being laid bare in the manner directed, and all the coagulated blood being carefully removed from

from the cavity of the tumor, on the tourniquet being now slackened so as to bring the orifice in the artery into view, a small probe is to be introduced at the opening, with a view to raise the artery from the neighbouring parts, so as that the surgeon may be enabled with certainty to pass a ligature round it without comprehending the contiguous nerves, which in general run very near to the large blood vessels of a limb. By this precaution, the nerves may be always avoided; and by doing so, a great deal of mischief may be prevented, which otherwise in all probability, might supervene. When the disorder is situated either in the ham, or in the usual place of bloodletting in the arm, bending the joints of the knee or of the elbow, as it relaxes the artery a little, renders this part of the operation more easily effected, than when the limbs are kept fully extended.

The artery being thus gently separated from the contiguous parts, a firm, broad, waxed ligature must be passed round it, about the eighth part of an inch above the orifice, and another must in the same manner be introduced at the same distance below it. Much harm, I am convinced, has been done by passing the ligature so far distant from the orifice as is commonly practised; for the risk of losing the benefit of anastomosing branches will be always increased in proportion to the extent of artery included between the ligatures.

The easiest method of introducing the ligatures, is by means of a blunt curved needle; and the form represented in Pl. V, fig. 2, will be found more convenient for this purpose than any other. An ordinary sharp needle is commonly made use of for this purpose; but it does not answer the intention so well as the one here recommended: By the sharpness of its points it is apt to injure the contiguous parts; and when the common crooked needle is used with a sharp edge on its concave side, there must even be some

risk

risk of its wounding the under part of the artery, as in this situation it cannot be introduced without making part of the needle pass quite in contact with the coats of the artery. The blunt needle is not liable to either of these objections; and besides, when of the form here represented, it is more easily introduced than any of the needles commonly used in this operation.

The ligatures being both passed in the manner directed, the upper one is now to be tied with a firmness sufficient for compressing the sides of the artery. The directions formerly given for forming the knot upon bleeding vessels in other parts, will apply with equal propriety here: The ends of the ligature ought by all means to be twice passed through the first noose, and this should again be farther secured by a single knot made above it. By many writers on this subject, a small bolster of linen is ordered to be inserted between the artery and the knot, in order to prevent the artery from being cut by it. This, however, is a very unnecessary precaution; for if the whole artery is not surrounded with the bolster, it will be just as liable to be cut by the ligature at any other part as where the knot is fixed: And besides, as we have already very fully remarked, there is no occasion whatever for making the ligature so tight on arteries as to run any risk of dividing them; a much less degree of pressure than is either commonly applied, or could have any influence in hurting them, being fully sufficient for compressing them in the most effectual manner.

The upper ligature being thus finished, before the knot is passed upon the other below the orifice, the tourniquet ought to be untwisted, in order to see whether any blood is now discharged by the wound in the artery or not. If blood flows in any considerable quantity, it affords a pleasant prospect of the success with which the operation will in all probability be attended,

as it clearly shows, that the anastomosing branches from the superior part of the artery are considerable enough for carrying on at least a tolerable degree of circulation in the under part of the member. At the same time, however, although blood should not be discharged at this time by the orifice, we are by no means, from this circumstance alone, to despair of success; for it frequently happens that the operation succeeds in a very effectual manner, although no blood whatever is discharged on the trial now recommended.

But whether any blood should be discharged by this trial or not, we are not to rest satisfied with one ligature; for unless the ligature below the orifice be also tied, there is always a risk, on the return of circulation to the under part of the artery, of blood passing out at the orifice: This precaution, therefore, should never be omitted; it is easily done, and it renders the patient quite secure against all farther evacuation of blood by the orifice. After the knots have been put upon the ligatures, these should be cut of such a length that their ends may lie fully out over the edges of the wound, so that when necessary they may be more easily withdrawn.

By way of greater security in this operation, it has been advised to insert other two ligatures quite contiguous to the former, and to leave them untied, so that if any of the others should happen to fail its place may be immediately supplied.

There is not, however, any necessity for this precaution, for, if the first ligatures are properly applied, there can be no doubt of their answering the purpose; and in case either one or both of them should give way, they can be very easily renewed: In the mean time, too, the patient is rendered safe against any sudden loss of blood by the tourniquet being left loose upon the upper part of the member, which it ought by all means to be for several days after the operation, so that, in the event of blood bursting from the wound,

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it may be secured by means of it, much more readily than if it depended on the tying of a ligature.

The ligatures being both finished in the manner directed, the tourniquet is now to be made quite loose; and if no blood is discharged at the orifice in the artery, we may then rest satisfied that the operation is so far properly completed.

The wound is now to be lightly covered with soft lint, with a pledget of any emollient ointment over the whole; and a compress of linen being applied over the dressings, all the bandage in any degree requisite, is, two or three turns of a roller above, and as many below the centre of the wound, making it press with no more tightness than is absolutely necessary for retaining the applications we have just now mentioned.

The patient being now put into bed, the member should be laid in a relaxed posture upon a pillow, and ought to be so placed as to create the least possible uneasiness from the posture in which it is laid.

As the operation for the aneurism is always tedious, and produces much pain and irritation, a full dose of laudanum should be given immediately on the patient being got into bed. In order to diminish sensibility during some of the more capital operations, I have made different trials of opiates given about an hour before the operation: On some occasions, this proved evidently very useful; but on others, it seemed to do harm; particularly in weak, nervous constitutions, in which with any doses I ever ventured upon, the patients appeared to be rendered more irritable and more susceptible of pain, than if no opiate had been given. Immediately after this operation, however, an opiate ought to be exhibited, and repeated occasionally according to the degrees of pain and restlessness.

In some few cases of aneurism it has happened, that the pulse in the under part of the member has been perceptible immediately after the operation. This, however, is a very rare occurrence: For as this disorder

order is seldom met with in any other part than at the joint of the elbow as a consequence of bloodletting, and as it rarely happens that the brachial artery divides till it passes an inch or two below that place, the trunk of this artery is therefore most frequently wounded; and when accordingly the ligature in this operation is made to obstruct the passage of almost the whole blood that went to the under part of the arm, there cannot be the least reason to expect any pulsation at the wrist, till in a gradual manner the anastomosing branches of the artery have become so much enlarged, as to transmit such a quantity of blood to the inferior part of the member, as is sufficient for acting as a stimulus to the larger branches of the artery.

Immediately after the operation, the patient complains of an unusual numbness or want of feeling in the whole member; and as it generally for a few hours becomes cold, it is therefore right to keep it properly covered with warm soft flannel; and in order to serve as a gentle stimulus to the parts below, moderate frictions appear to be of use. In the space of ten or twelve hours from the operation, although the numbness still continues, the heat of the parts generally begins to return; and it frequently happens in the course of a few hours more, that all the inferior part of the member becomes even preternaturally warm.

Although physiological discussions are not immediately connected with our subject, and although for that reason we shall not often enter into them; yet we cannot here avoid remarking the very clear proof which after this operation always occurs, of the great dependence one part of the human frame has upon another. The nerves we know to be the instruments of sense and motion; but on being deprived of their usual support from the sanguiferous system, their influence immediately diminishes.

Immediately

Immediately after this operation, the want of feeling in the parts is often very great; and in proportion as the circulation in the under part of the member becomes more considerable, the degree of feeling also augments. If we could suppose the nerves of the parts below to be always included in the ligature with the artery, that numbness which succeeds immediately to the operation, might be easily accounted for; but I have known it happen, when I was certain that nothing but the artery was secured by the ligature: And besides, although the knot upon the nerves would account for the immediate loss of sensibility which succeeds to the operation, it would not in any degree serve to explain the return of feeling on the circulation being again restored; for the nerve having been destroyed by the effects of the ligature, if the want of feeling produced here originated entirely from that circumstance, it could not be expected to be much influenced by the return of blood to the part.

In the mean time the patient being properly attended to as to regimen, by giving him cordials and nourishing diet when low and reduced, and confining him to a low diet if his constitution is plethoric, the limb being still kept in an easy relaxed posture, towards the end of the fourth or fifth day, sometimes I have known it much sooner, a very weak feeble pulse is discovered in the under part of the member, which becoming stronger in a gradual manner, the patient in the same proportion recovers the use and feeling of the parts.

As soon as there is an appearance of matter having formed freely about the sore, which will seldom happen before the fifth or sixth day, an emollient poultice should be applied over it for a few hours, in order to soften the dressings, which may be then removed. At this time, too, the ligatures might be taken away; but as their continuance for a day or two longer can do no harm, it is better to allow them to remain till the

the second or third dressing, when they either drop off of themselves, or may be taken away with perfect safety. The dressings, which should always be of the softest materials, being renewed every second or third day according to the quantity of matter produced, the sore is in general found to heal very easily; and although the patient may for a considerable time complain of a great degree of numbness and want of strength in the whole course of the diseased limb, yet in most instances a very free use of it is at last obtained.

It will be readily supposed, that the termination of this operation as we have here described it, is the most favourable that can possibly happen. In some instances, the success attending it is far from being so complete: Instead of a return of circulation, and of the feeling and use of the parts, they remain cold and insensible, and no marks of returning life are perceived. From a mere want of blood, therefore, mortification at last commences; and as nature is here deprived of one of her principal agents for the removal or separation of gangrenous parts, I mean the efforts of the sanguiferous system, whenever the parts in such circumstances begin to mortify, nothing can prevent their progress to the ultimate stage of that malady.

Whenever mortification ensues, therefore, as a consequence of this operation, if the patient survives the immediate effects of it till a separation occurs between the healthy and diseased parts, amputation of the member will then be the only resource.

That this operation when practised upon the principal artery of the superior part of a member, does now and then terminate in this manner, no practitioner of experience will deny; but its doing so in some instances, is not a sufficient reason for rejecting it in every case. The event of every capital operation we know to be very uncertain; and in this, as in every other of equal importance, as we cannot in any case say with precision how it is to answer, so we are never

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to put it in practice where means of a less hazardous nature will succeed: And on the contrary, whenever these are found to fail, and the patient's life comes to be in danger, it ought undoubtedly to be performed without farther hesitation.

CHAP.

CHAP. V.

OF HERNIÆ.

SECTION I.

Of HERNIÆ *in* GENERAL.

THE term Herniæ might with propriety be applied, to every ſwelling occaſioned by the diſlodgment of parts from thoſe boundaries within which in a ſtate of health they are contained; but the term in its general acceptation, implies, a tumor produced by the protruſion of ſome part or parts from the cavity of the abdomen.

The parts in which theſe ſwellings uſually appear, are the groin, ſcrotum, labia pudendi, the upper and fore part of the thigh, the umbilicus, and different points between the interſtices of the abdominal muſcles.

If the ſituation of ſuch tumors be various, the viſcera which they contain are ſtill more ſo; inſtances having occurred of the ſtomach, uterus, liver, ſpleen, and bladder, being found to form their contents. But a part of the inteſtinal canal, or a portion of the omentum, are from experience known to be the moſt frequent cauſe of their formation.

From theſe circumſtances of ſituation and contents, all the different appellations are derived by which herniæ are diſtinguiſhed. Thus they are termed Inguinal, Scrotal, Femoral, Umbilical, and Ventral; from

from their appearing in the groin, ſcrotum, thigh, navel, or belly. When the tumor is confined to the groin, the hernia is ſaid to be incomplete, and is termed Bubonocele; but, when the ſwelling reaches down to the bottom of the ſcrotum, the rupture is then ſuppoſed to be complete, and the diſeaſe obtains the name of Scrotal Rupture, or Oſchiocele.

When a portion of gut alone forms the tumor, it is called an Enterocele, or Inteſtinal Hernia; when a piece of omentum only has got down, it is termed Epiplocele, or Omental Hernia; and if both inteſtine and omentum are down, it is called an Entero-epiplocele, or Compound Rupture.

As all the abdominal viſcera are apparently contained within the cavity of the peritonæum, and as it was thought impoſſible for that membrane to admit of ſuch a degree of diſtention, as to ſurround tumors containing ſuch large portions of the different viſcera as are at times protruded, it was therefore commonly ſuppoſed, that in at leaſt the greateſt number of caſes of hernia, the peritonæum muſt certainly be burſt or ruptured; and from this the term Rupture was in all ſuch inſtances ſuppoſed to be applied with propriety enough. The idea was farther confirmed too, from its having been obſerved, that in caſes of ſcrotal hernia, the protruded viſcera were in ſome inſtances found in contact with the teſticle; a circumſtance, which it was ſuppoſed could not poſſibly happen, if the peritonæum had not been previouſly ruptured.

Since the anatomy of theſe parts, however, was better underſtood, this circumſtance, of parts protruded from the abdomen being on ſome occaſions found in contact with the teſticle, is explained in a more ſatisfactory manner than on the ſuppoſition of a rupture of the peritonæum; an occurrence which we ſuppoſe will very rarely happen, in any other manner than from external violence: But as the nature of theſe diſorders cannot be properly underſtood without a

previous knowledge of the anatomy of the parts concerned, it will be proper, before proceeding farther, to deſcribe ſuch as here become the more immediate ſubjects of operation; and theſe are, a part of the abdominal muſcles; the peritonæum; teſticles; and ſpermatic veſſels.

The ſides and other fleſhy boundaries of the abdomen are formed by five pairs of muſcles; viz. the recti, pyramidales, tranſverſales, obliqui interne, and obliqui externi.

In ſome ſubjects, the pyramidales are wanting; and as the obliqui externi are in general thoſe which in caſes of hernia come to be moſt connected with the diſorder, we ſhall here confine our deſcription to the anatomy of theſe only.

The obliqui externi are two thin, broad muſcles: On their poſterior and upper parts they are fleſhy; and tendinous on their anterior and lower parts. They originate from the eighth, ninth, and inferior ribs, by fleſhy portions which intermix in a ſerrated manner with correſponding parts of the latiſſimus dorſi, ſerratus major anticus, pectorales major, and intercoſtales: And afterwards becoming tendinous, they form the greateſt part of all the anterior ſurface of the abdomen, and are inſerted into the linea alba, the ſpine of the os ilium, and into the os pubis. On each ſide of the under part of the abdomen immediately above the pubes, two openings are met with in theſe tendons, intended for the paſſage of the ſpermatic veſſels in men, and for the ligaments of the womb in women. Theſe openings, or rings as they are termed, which ſeem to be formed merely by a ſeparation of the fibres of the tendon from one another, are of an oval figure, and have an oblique direction from the ſpine of the ileum downwards; they are ſomewhat wider above than below, and are rather of a larger ſize in men than in women.

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Although these rings or openings have been commonly described as passing through not only the external oblique, but the transversales and internal oblique muscles also; yet it is now certainly known, that it is in the tendinous parts of the external oblique muscle only, that any such opening exists. It is of some importance to the student to be thoroughly acquainted with this circumstance: For, by the accounts received of it from books, one is led to suppose, that, instead of one distinct passage, there are always three to be met with here. These muscles are likewise perforated in the middle by the umbilicus, which affords a passage for the connecting vessels between the mother and uterine fœtus, and which is continued through life, being filled up by cellular substance only.

From the inferior border of the tendinous part of the external oblique muscle, a detachment of fibres is sent off, which, after affording a firm covering to the inguinal glands, are lost in the fascia lata of the thigh: And the under edge of this tendon being folded inwards, obtains the appearance of a ligament, which stretches from the fore part of the os ileum to the pubes, forming a kind of arch, through which pass the great blood vessels of the lower extremity. It is this ligamentous like portion of the external oblique muscle, which is known by the appellation of Poupart's or Fallopius's ligament.

This passage for the blood vessels of the thigh, being larger in women than in men, owing to the greater size of the pelvis in the former, by which the arch formed by Poupart's ligament is rendered both longer and wider; so in them the crural hernia, or that species of the disease formed by a protrusion of parts through this passage, is found to occur much more frequently than in men.

The internal surface of the muscles of the abdomen, together with every other part of that cavity, is lined with a smooth somewhat elastic membrane, termed Peritonæum.

Peritonæum. This membrane, beſides lining the cavity of the belly, furniſhes the external covering to almoſt every viſcus contained in it; but, in ſo ſingular a manner are theſe coverings produced, that although at firſt ſight the different viſcera appear all to be contained within the cavity of the peritonæum, yet on a minute examination they are in reality found to lie behind it.

The peritonæum, after having completely lined the cavity of the abdomen, is continued or reflected over all the viſcera, ſo as to give an external covering to each. After ſurrounding one viſcus, it ſtretches along to the moſt contiguous, forming in its courſe the ſupporting membranous ligament of the liver and other viſcera; and affording in its duplicature a kind of ſupport or connection to the various blood veſſels, as they ſtretch along to their deſtined ſituations in the inteſtinal canal and other organs.

Behind the peritonæum lies a quantity of looſe cellular ſubſtance, by authors commonly termed its Appendix. In ſome parts this ſubſtance is filled with fat; and in others it is empty, and can eaſily be filled with air.

The teſtes in the fœtus are, till near the period of delivery, lodged in the cavity of the abdomen, in the ſame manner with the reſt of the abdominal viſcera. They are ſituated immediately below the kidneys, on the fore part of the pſoæ muſcles, near to the upper end and by the ſide of the rectum, where their external covering adheres by its poſterior ſurface to thoſe parts of the peritonæum on which they reſt, while all their anterior and lateral ſurfaces lie looſe in the abdominal cavity in contact with the other viſcera. Even in this ſituation, however, a connection takes place between the teſtes and ſcrotum. This is formed by means of a ſubſtance, which runs down from the under end of the teſtis to the ſcrotum, forming a kind of pyramidal ſhaped ligament; its large bul-

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bous head being fixed to the lower end of the teſtis and epididymis and its under extremity, after having paſſed through the ring i.. the external oblique muſcle, being loſt in the cellular membrane of the ſcrotum. This ligament is evidently vaſcular and fibrous, and ſeems in part to be compoſed of the cremaſter muſcle turned inwards*.

All that portion of the ligament contained within the parietes of the abdomen paſſes behind the peritonæum, and receives a covering from it in the ſame manner with the teſtes and other viſcera; and the peritonæum even gives a coat to a portion of the ligament after it has got into the groin, by paſſing down along with it from the abdomen into the upper part of the inguen.

At this place, viz. at the annular opening of the external oblique muſcle, the peritonæum is very looſe; and when the ligament and ſcrotum are drawn downwards, an aperture is obſerved from the cavity of the abdomen all around the fore part of the ligament, which ſeems ready to receive the teſtis; and this aperture gradually becomes larger as the teſtis deſcends behind the peritonæum in its way to the ſcrotum. While the teſticle is ready to deſcend, it does not fall down, as has been commonly imagined, along the fore part of the peritonæum, between it and the other viſcera; but this ligament we have now deſcribed as lying behind the peritonæum, and which is connected with the teſtis at its under and poſterior parts, by directing or pulling it down as it were from behind, brings it in this manner along the pſoas muſcle between it and the peritonæum; and that part of this membrane to which we have ſhown that the teſticle adheres, being neceſſarily drawn along with it, a kind of pouch or bag, ſomewhat reſembling the finger of a glove, is thus formed by this elongation of the peritonæum

* See a very accurate account of the Anatomy of theſe parts by Mr. J. Hunter, in Dr. Hunter's Medical Commentaries.

itonæum; the under extremity of which ſtill continues to ſurround the teſtis as it goes along, in the ſame manner as it did when that viſcus reſted upon the pſoas muſcle; and the entrance from the abdomen to the cavity of this proceſs, is exactly at that point where the teſtis was originally ſituated; for it is there that this proceſs commences when the teſtis begins to deſcend.

The peritonæum being in a fœtus remarkably lax and dilatable at this part, and being connected poſteriorly, as we have ſeen, with a quantity of very looſe cellular ſubſtance, its elongation produced by the deſcent of the teſticle is in this manner provided for by nature, and of courſe is eaſily admitted of.

It muſt not, however, be ſuppoſed, that the teſtis and peritonæum in coming down fall looſely and without connection; for, as they ſlide down very gradually, they ſtill continue to adhere to the parts lying behind them as they did when in the abdomen.

The preciſe time at which the teſtis paſſes down from its original ſituation in the abdomen, cannot be exactly determined; but in general, this change takes place about the eighth month. About this period, the teſtis ſurrounded with the peritoneal proceſs, moves downwards till its under extremity comes into contact with the moſt inferior point of the abdominal parietes; and by this time the paſſage through the tendon of the external oblique muſcle is found a good deal enlarged, by the ligament of the teſtis having ſunk downwards ſo as to produce a conſiderable dilatation of it.

After the teſtis has paſſed the tendon of the muſcle, it commonly remains for ſome time by the ſide of the penis, and by degrees only deſcends to the bottom of the ſcrotum; and even when it has got entirely into the ſcrotum, its ligament is ſtill connected with it, and lies immediately under it, but is ſhortened and compreſſed.

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The proceſs of the peritonæum, which we have ſhown to deſcend with the teſticle, continues to cover it when it has reached the ſcrotum: And it is this looſe covering or bag which is afterwards converted into what Anatomiſts term the *Tunica Vaginalis Teſtis*; and from the deſcription we have given of it, it is evident, that the cavity of this bag muſt at firſt communicate with the great peritoneal cavity of the abdomen. This it accordingly does, as a probe may be paſſed readily and eaſily along this proceſs or bag, from the belly down to the bottom of the ſcrotum; and if it be laid open through its whole length on the fore part, it will be plainly ſeen to be a continuation of the peritonæum; the teſtis and epididymis will be found at the lower part of it without their looſe coat the tunica vaginalis; and as the ſpermatic veſſels and vas deferens, while the teſticle remained in the abdomen, entered the body of it behind, and between the reflected lamina of the peritonæum, ſo here when in the ſcrotum they will be found covered by the poſterior part of the bag, in their whole courſe from the commencement of that proceſs down the groin to the teſticle.

This paſſage from the cavity of the abdomen to the ſcrotum is in general very ſoon cut off, by a firm adheſion being produced between the ſides of the peritoneal proceſs at its upper extremity where it deſcends from the abdomen. What the cauſe of this adheſion may be, is uncertain; perhaps it may proceed from ſome ſlight degree of inflammation being excited upon the contiguous parts by the forcible paſſage of the teſtis; but whatever the cauſe may be, the fact is, that at the time of birth this paſſage in general is completely obliterated.*

It

* The deſcent of the teſtes from the abdomen is a phenomenon very difficult to account for, and its immediate cauſe may probably always remain a myſtery; but their being in almoſt every inſtance found in the ſcrotum before birth, is a clear proof of their not being forced down by the effects of reſpiration, as has been commonly ſuppoſed.

It is in the neck only, however, or ſuperior part of this proceſs, that ſuch an adheſion takes place; as the lower extremity of the ſac remains open and looſe through life, and forms, as we have already ſaid, the tunica vaginalis teſtes: The common ſeat of a hydrocele.

If the ſmalleſt attention be given to this deſcription, it muſt appear evident, that if immediately upon the teſticle deſcending from the abdomen, and before the paſſage is ſufficiently contracted, any portion of the alimentary canal or omentum ſhould likewiſe fall into the opening, ſuch parts muſt for certain lodge in the ſame bag or covering with the teſtis itſelf; and that as long as they remain there, they muſt effectually prevent the uſual obliteration of the paſſage from being accompliſhed.

It is this occurrence, of a portion of ſome of the abdominal viſcera getting into the tunica vaginalis teſtes, which forms that ſpecies of hernia to which new born infants are liable, termed by Haller the Hernia Congenita. The teiſtcle and protruded inteſtine being here in contact with one another, the tunica vaginalis teſtis forms the hernial ſac.

If the gut, or other parts which have fallen down, be again puſhed into the abdomen, and are retained there by proper bandages or any other means, in that caſe the paſſage is ſoon cloſed up, and no return of the diſorder is obſerved. But this being neglected, and the gut being allowed to remain long down, the parts forming the paſſage ſeem thereby in a great meaſure to loſe that power of adheſion which naturally they are known to poſſeſs; inſtances of ſuch caſes having occurred where no art has been able to produce this wiſhed for obliteration of the opening.

The hernia congenita is uſually produced in the manner now deſcribed; it is probable, however, that the ſame diſorder may, and frequently does, occur, from this paſſage between the abdomen and teſticle,

after

after having been once closed, being again rendered pervious, in consequence of the parts being over stretched by those violent fits of coughing, crying, and other convulsive affections to which children soon after birth are now and then liable. The intestinal canal and other viscera, being on such occasions pushed with violence against all the containing parts, these will most easily give way where the least degree of firmness occurs; and this we may readily suppose will most probably happen in such parts as have been most recently united. In this manner it is probable that the greatest proportion of those cases of hernia are produced which occur in the early months of infancy; and I am even inclined to think, that on some occasions in more advanced periods of life, the same species of hernia may likewise occur from the same cause.

It is evident, then, in what manner the hernia congenita is produced; we shall now inquire into the causes which tend to the production of hernia in its more usual form.

I. The containing parts of the abdomen we know to be elastic and compressible; whatever, therefore, tends to produce a diminution of capacity in the cavity of the abdomen, must occasion a proportional degree of risk, of some of the contained parts being pushed from their natural situations. Violent coughing, crying, laughter, or great bodily exertion, are attended with more or less contraction of the abdominal muscles, and particularly of the diaphragm; and as the contraction of these muscles, must always diminish the abdominal cavity, these causes therefore are frequently found to be productive of hernia.

II. Falls, in consequence of the derangement they produce in the abdominal viscera, from the sudden and violent shock with which they are often attended, are not unfrequently the immediate causes of hernia.

III. Persons of a preternatural laxity of frame, are very liable to hernia. The containing parts of the

abdomen, from the want of a ſufficient tone and firmneſs, are unable in ſuch people to reſiſt on all occaſions the weight of the different viſcera; and they are therefore more particularly expoſed to diſorders of this kind on the ſlighteſt application of any of the cauſes already mentioned.

IV. Sprains are apt to induce a laxity of the part injured; and have therefore a ſimilar influence in inducing herniæ, with general laxity.

V. It has been obſerved, that the people of thoſe countries where oil is much uſed as an article of diet, are particularly liable to herniæ.

In whatever parts the parietes of the abdomen happen to be weakeſt, theſe various cauſes will moſt readily operate in producing herniæ; and accordingly we find, that deſcents of the bowels uſually occur only in ſuch parts.

The parts which from anatomy we would *à priori* ſuſpect to be moſt liable to ſuch protruſions, are, the openings already deſcribed in the external oblique muſcles; the arch formed by Poupart's ligament for the paſſage of the great blood veſſels of the thigh; and the umbilicus, where the ſame degree of firmneſs does not take place as is met with in the reſt of the tendinous expanſion of the abdominal muſcles.

Theſe, as we have already ſaid, are the uſual ſeats of hernia; but it ſometimes happens that parts of the viſcera are protruded between the interſtices of the different muſcles of the abdomen: Theſe, however, are not frequent occurrences.

In whichever of theſe ſituations a protruſion of any portion of the inteſtines occurs, except in the caſe of the hernia congenita, as all the viſcera are contained in the manner already deſcribed within the peritonæum, a portion of that membrane, it is evident, muſt be carried down together with the parts protruded; and in every ſuch inſtance, it is this portion of the peritonæum which goes down along with the gut that

is

is termed the Hernial Sac. The ſize of this ſac is various in different ſubjects, and in different ſtages of the ſame diſorder.

On the firſt appearance of the diſeaſe, the ſac is commonly of no very conſiderable ſize, as ſuch ſwellings ſeldom acquire any great bulk at once: But by repeated deſcents of the bowels, the ſac comes to be puſhed lower and lower, till in ſome inſtances its bulk becomes very conſiderable indeed; and when in this advanced period of the diſorder the ſac happens to be laid open, it is found to contain either large quantities of omentum or inteſtine, and frequently large portions of each.

As the peritonæum has this property in common with many other parts of the body, of thickening according to the degree of any gradual extenſion applied to it, ſo in many inſtances the thickneſs and firmneſs of the hernial ſac are often really aſtoniſhing.

Although every inſtance of a bowel protruded from its natural ſituation is to be conſidered as a derangement, and as ſuch demands our attention, yet daily inſtances occur, both of recent herniæ, and of thoſe of longer ſtanding, in which no bad ſymptoms are produced by ſuch protruſions of the viſcera. Thus it is well known, that hernial ſwellings of every kind very frequently happen, without the patient ſuffering in any other manner, than from the inconvenience ariſing from the bulk of the tumors. But in general this is otherwiſe; troubleſome ſymptoms moſt frequently occur; and at all events, when the reduction of a hernia can be accompliſhed with any kind of propriety, it ought always to be effected as quickly as poſſible.

All the bad ſymptoms which are found to occur in herniæ, proceed, as may be readily ſuppoſed, either from obſtruction to the paſſage of the feces when the inteſtinal canal forms the tumor, or from a ſtoppage of circulation occaſioned by ſtricture on the prolapſed parts;

parts; ſo that the attending ſymptoms, it is evident, will be always more or leſs hazardous, according to the nature of the parts ſo protruded.

Thus, when a portion of the omentum alone forms the ſubſtance of hernial ſwellings, as that organ does not appear to be ſo immediately neceſſary to life as many of the other viſcera, ſuch tumors accordingly are not ſo frequently productive of bad conſequences, at leaſt they are ſeldom in any degree ſo hazardous, as when a part of the alimentary canal is either protruded by itſelf, or along with omentum.

Although this, however, is in general the caſe; yet it does ſometimes happen, that even an omental rupture is productive of no ſmall degree of danger. When a ſtricture ſo complete upon it occurs, as to occaſion a ſtoppage of circulation in the protruded part, mortification with all its bad conſequences muſt be the certain event: And beſides, the connection between the omentum, ſtomach, and other viſcera, is ſuch, that a ſudden deſcent of any conſiderable portion of the former ſometimes brings on vomiting, hickup, and other troubleſome ſymptoms: And laſtly, although a rupture containing omentum only, might not of itſelf produce any thing bad; yet as the paſſage through which the omentum has ſlipped, muſt of neceſſity continue open as long as that viſcus remains protruded, and as that circumſtance alone muſt as long as it continues render it more eaſy for a portion of gut likewiſe to get down, this of itſelf is a ſufficient reaſon for beſtowing even upon this ſpecies of hernia our ſerious attention.

But whatever the contents of ſuch ſwellings may be, as their remaining in ſome inſtances for a conſiderable length of time without being productive of any bad ſymptoms, muſt proceed entirely from the circulation continuing to go freely on, notwithſtanding the derangement of parts; ſo, whenever a ſtricture occurs upon the protruded viſcera, ſufficient to pro-

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duce either a ſtoppage of the circulation, or of the fæcal contents of the alimentary canal when a portion of gut forms the diſeaſe, the following in general are the ſymptoms which accrue.

An elaſtic colourleſs ſwelling is obſerved at the part affected; a ſlight pain is felt not only in the ſwelling itſelf, but, if part of the alimentary canal is down, an univerſal uneaſineſs is perceived over the whole abdomen; and this pain is always rendered worſe by coughing, ſneezing, or any violent exertion. The patient complains of nauſea; frequent retching; can get no diſcharge by ſtool; becomes hot and reſtleſs; and the pulſe is commonly found quick and hard.

If the ſwelling is entirely formed by a portion of gut, and if no feces are contained in it, it has a ſmooth, equal ſurface; and is eaſily compreſſible, but inſtantly returns to its former ſize on the preſſure being removed. But, in gut ruptures of long ſtanding, where hard feces have collected in the protruded bowels, conſiderable inequalities are detected.

When again the tumor is compoſed both of gut and omentum, its appearance is always unequal, it feels ſoft and ſomewhat like dough, and of courſe is not ſo elaſtic as when part of the inteſtinal tube only is down; for although like the other it is compreſſible, it does not ſo readily regain its former dimenſions on the preſſure being taken off.

It has been a received opinion, that in caſes of ſtrangulated hernia, the ſymptoms ſhould be leſs violent when the inteſtine is accompanied by a portion of omentum, than when gut alone is down. Little or no difference, however, is produced by this circumſtance; for when a gut becomes obſtructed and inflamed, the ſymptoms thereby induced are nearly the ſame whether the omentum be down with it or not.

It will be readily ſuppoſed, however, that the ſymptoms we have deſcribed never can happen from the preſence of omentum only: For although ſtricture produced

produced on a portion of omentum, even when no part of the inteſtinal tube is down, does now and then occaſion a good deal of diſtreſs, ſuch as pain in the part, ſickneſs, vomiting, and twitching pains through the whole belly; yet no obſtruction of the gut ever occurs from this, and of courſe none of the ſymptoms ever prove ſo alarming as when any part of the gut is concerned.

If theſe ſymptoms we have deſcribed as being produced by a ſtrangulated gut, are not now obviated by a removal of the ſtricture which produced them, the nauſea and retching terminate in frequent vomitings, firſt of a bilious, and afterwards of a more fetid matter; the belly becomes tenſe; the pain turns more violent; a diſtreſſing convulſive hickup comes on; and the fever, which before was not apparently of much conſequence, now becomes very formidable, and a total want of reſt with a very diſagreeable ſtate of anxiety continues through the whole courſe of the complaint.

Theſe ſymptoms having gone on with violence for ſome time, the patient is at laſt for the moſt part ſuddenly relieved from all manner of pain, when he flatters himſelf every riſk is for certain over. But inſtead of that, the pulſe, from having been hard and frequent, becomes languid and interrupted; cold ſweats break out over the whole body, but eſpecially on the extremities; the eyes acquire a kind of languor; the tenſeneſs of the abdomen ſubſides, and the ſwelling of the part affected diſappears; the teguments covering the parts, which before were either of a natural appearance, or had ſomewhat of a reddiſh inflamed caſt, now acquire a livid hue, and a windy crepitous feel is diſtinguiſhed all over the ſwelling.

If the protruded parts have not of themſelves gone entirely up, their return is now in general eaſily effected by a ſmall degree of preſſure; and the patient then diſcharges freely by ſtool; but the cold ſweats increaſing,

increasing, the hickup turns more violent, and death itself is at last ushered in by its usual forerunners, subsultus tendinum and other convulsive twitchings.

These are the ordinary symptoms of what is termed a strangulated or incarcerated gut hernia; that is, when the parts protruded become so affected by stricture, as to produce pain; and do not either return to their natural situations on the patient getting into a horizontal posture, or cannot even be immediately replaced by the hands of a practitioner.

In whatever situation a strangulated hernia occurs, the only rational method of cure, it is evident, must consist in the removal of that stricture which prevents the return of the protruded parts. It is that which ought to be considered as the cause of all the mischief; and unless it be removed, nothing effectual can be done for the relief of the patient.

Various methods have been attempted by practitioners for the removal of stricture in these disorders; all of them, however, may be comprehended under two general heads.

I. Such as effect a reduction of the protruded parts, without the interposition of incision or any chirurgical operation properly so called; and,

II. A division of the parts producing the stricture, so as to admit of a replacement of the deranged viscera, constituting what is termed the Operation for the Hernia.

The remedies to be employed for accomplishing the first of these, are, a proper posture of the patient, with the manual assistance of a practitioner; bloodletting; stimulating glysters; opiates; the warm bath; and proper applications to the tumor itself.

As soon as the assistance of a practitioner is desired for the removal of symptoms in cases of hernia, the first circumstance requiring his attention, is, the placing his patient in such a posture as will most probably favour the return of the protruded parts. Thus, when the

the tumor is in the groin, or in the fore part of the thigh, the patient ought to be ſo placed, as to raiſe his thighs and legs conſiderably higher than his head and trunk; that is, he ſhould be placed almoſt perpendicularly upon his head.

This poſition cauſes almoſt the whole quantity of inteſtines to hang or ſwing by the protruded parts, which frequently proves a means of effecting their reduction. Placing the patient's feet over the ſhoulders of another perſon, while at the ſame time his body is allowed to hang downwards, and cauſing him in this poſture to be a good deal jolted about, has on ſome occaſions been known to anſwer when every other means has been tried in vain.

For the ſame reaſon that in the inguinal and femoral hernia the poſition now mentioned is more adviſable than any other, the uſual erect poſture of the body becomes moſt proper in caſes of exomphalus or umbilical rupture; and again, a horizontal poſture is moſt likely to prove ſerviceable in caſes of ventral hernia.

While the patient thus remains in the moſt ſuitable poſture according to the ſeat of the diſorder, the ſurgeon ſhould at the ſame time endeavour to aſſiſt the return of the gut or other parts, by means of gentle preſſure with his hands and fingers. In the inguinal or ſcrotal hernia, this preſſure ſhould be made obliquely upwards towards the os ileum, ſo as to correſpond as nearly as poſſible with the opening in the external oblique muſcle. In the femoral hernia, the preſſure ought to be made directly upwards; in the umbilical hernia, downwards and backwards; and in the ventral hernia, directly backwards.

When tumors of this nature are of any conſiderable ſize, preſſure, as we have here recommended, is moſt conveniently made, by graſping the ſwelling with one hand from the bottom upwards, while with the fingers of the other hand we endeavour to puſh forward

forward the contents at the ſuperior part of the tumor. Some ſurgeons, in puſhing forward the inteſtine, employ the fingers of both hands at the upper part of the tumor; but the ſame purpoſe is anſwered equally well with the index and middle finger of one hand, while the other hand is employed to great advantage in preſſing the under part of the tumor upwards ſo as to cooperate in this manner in the reduction of the parts. It is this operation which by authors is termed the *taxis*. No deſcription, however, can convey an adequate idea of the manner of performing it properly: for, like many other circumſtances in the art of ſurgery, the knowledge of it can only be acquired by repeated experience and attentive obſervation: But this muſt always be had in view, that any preſſure that is applied, muſt be of the moſt gentle kind; for every thing of this nature that creates much pain, is very prejudicial, and ought by all means to be avoided.

If a very moderate degree of preſſure applied in the manner deſcribed, does not effect a reduction of the tumor, other means muſt be immediately employed. Bloodletting is here a principal remedy. In no diſorder is it either more indicated from appearances, or affords more relief in reality. The quantity to be taken away ought in a great meaſure to be determined by the ſtrength of the patient: But if in any caſe we can with propriety venture upon abſtracting large quantities of blood from weak people, it is here; and it is often aſtoniſhing to what length this evacuation is carried in caſes of hernia without being productive of any prejudice to the ſyſtem. A ſtate of deliquium being known to produce a more effectual relaxation of the various muſcular parts of the body, than can be obtained by any other means, it has ſometimes been adviſed, in caſes of hernia, to take off ſuch large quantities of blood, and in ſuch a ſud-

den manner, as to produce fainting; and the practice has now and then been attended with advantage.

As an obſtinate coſtiveneſs is commonly one of the moſt alarming ſymptoms of hernia, it has been a common practice to preſcribe not only a variety of ſtimulating purgatives by the mouth, but injections compoſed of the moſt acrid materials. From all the experience, however, which I have had in diſorders of this nature, I am convinced that purgatives are very ſeldom productive of much good; and when they do not prove uſeful, they almoſt univerſally do miſchief, by increaſing not only the ſickneſs at ſtomach which always prevails here, but even by adding to the pain and tenſion of the tumor. I am clear, therefore, that remedies of this kind ſhould not be puſhed ſo far as they commonly are; and when they are applied, inſtead of purgatives by the mouth, which always prove very nauſeating, and in this ſtate are uſually rejected by the ſtomach, I would recommend tobacco ſmoke thrown up in the form of injections, as preferable to every other remedy. A variety of machines have been contrived for injecting ſmoke by the anus; but none of them I have met with anſwer the purpoſe either ſo eaſily or ſo effectually as the inſtruments repreſented in Plates VI, and VII. They are eaſily procured; and by means of either of them, ſmoke may be injected with any neceſſary degree of force.

I would not have it ſuppoſed, however, that I recommend tobacco ſmoke uſed in this manner as an infallible purgative, as many have done. For the contrary is certainly the caſe; I have known it uſed in a great number of caſes both of hernia and ileus, and ſeldom with any advantage. I only adviſe it as the moſt effectual remedy of this kind with which I am acquainted; and I know that the method here recommended of injecting it, is the moſt effectual hitherto invented. It has been objected to theſe inſtruments we have delineated, that we cannot when they

Plate VI.

Fig. 4.

Fig. 1.

Fig. 2.

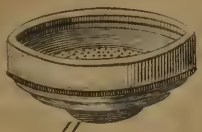


Fig. 3.

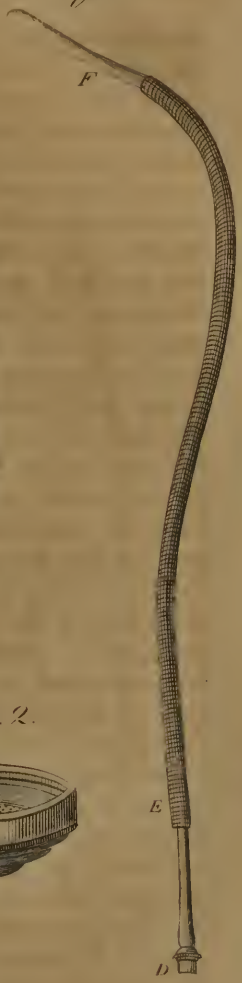


Plate VII.

Fig. 2.

Fig. 3.

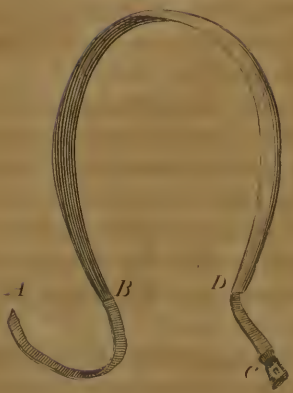
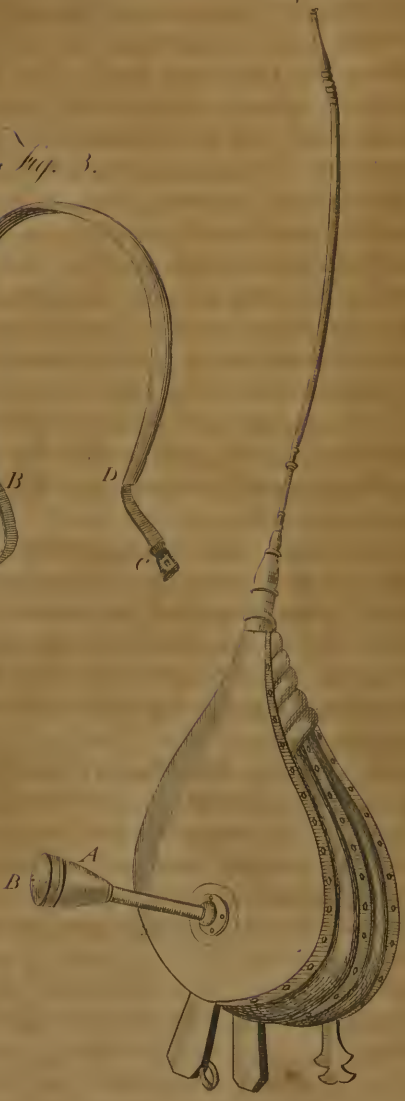


Fig. 1.



they are employed ascertain the quantity of smoke injected. But this is a nicety of little importance; as the rule in all such cases should be, to continue to throw up the smoke, either till it has produced the wished for effect, till a considerable degree of sickness is induced, or till the abdomen is found to be somewhat distended by it, as in some patients a third or even a half more may be necessary for this purpose than is found to answer in others.

But although this remedy does not frequently answer as a purgative, it often, both in cases of hernia and ileus, proves a very effectual anodyne. And as we are frequently in such cases deprived of the advantage of opium, by its being rejected by the stomach, in such instances, when the pain is very severe, it may be always employed as one of the best means of procuring ease.

With the same view as the remedy last mentioned, acrid suppositories, composed of soap, aloes, and other stimulating materials, have been recommended; and when remedies of this class are to be used, these may be considered as a necessary addition to the other purgatives; but no great dependence ought ever to be placed upon them.

I know, we are told that in some cases of hernia, the use of drastic purgatives has been of advantage; but I have so frequently known them do harm, by increasing the nausea, pain, and inflammation of the strangulated gut, that I am under no difficulty in saying that they ought seldom, if ever, to be used in any case of hernia.

Opiates are here often of service, not only by relieving pain, but as tending to relax those parts which, by being preternaturally constricted, we consider as the principal cause of the disorder. We have already observed, however, that the constant retching which occurs in most cases of hernia, prevents the exhibition of opiates by the mouth; but in such instances they

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may be applied with ſome advantage in the form of injection, and their uſe may be alternated with that of tobacco ſmoke as we have above recommended.

Warm bathing is another remedy from which much advantage has been received in diſorders of this nature. It is not the local application of heat, however, in the form of poultices and fomentations, &c. we mean to recommend, but the univerſal warm bath, in which the whole body is immerſed, and which we know to be poſſeſſed of very relaxing powers.

The latter, viz. the general warm bath, by tending to relax the conſtriction on the protruded inteſtines, has frequently had a conſiderable influence in promoting their replacement; but the former, viz. poultices and other means of applying local heat to the ſwelled parts, although commonly employed, are undoubtedly very prejudicial. On the conſtricted tendon they can have no influence, for it always lies ſo deep as to be out of the reach of every local application of this nature: And as the heat conveyed by ſuch remedies, muſt for certain tend to rarefy the contents of ſuch ſwellings, by their thus producing an increaſe of ſize in the tumors to which they are applied, inſtead of anſwering any good purpoſe, on this principle it is evident they muſt do harm; and accordingly, whoever will attentively obſerve their effects, will find this to be the caſe. When the external teguments are much inflamed and painful, by their emollient properties they now and then afford ſome relief; but the eaſe ſo obtained is only momentary, as the pain commonly ſoon becomes more violent than before they were employed.

Whoever attentively conſiders the nature of theſe diſorders, and the means generally found moſt effectual in relieving them, will probably coincide with us, in imputing the bad ſymptoms which occur in caſes of hernia, to a ſtricture induced upon the protruded parts. By many, however, a contrary opinion has been

been inculcated; and the principal cauſe of the various ſymptoms which occur here, has been ſuppoſed to be, inflammation, or ſome ſpaſmodic affection of the protruded parts, independent of any ſtricture of the parts through which theſe have paſſed.

That inflammation of the prolapſed bowels, whatever may originally have produced it, will in general terminate in all the ſymptoms of ſtrangulated hernia, no perſon will deny; but that ſtricture of the ſurrounding tendons is by much the moſt frequent cauſe of them, we think is ſo very obvious, as to render it quite unneceſſary here to adduce any arguments in ſupport of the opinion: This, however, we muſt remark, that even on the ſuppoſition of the origin of all the miſchief lying in the protruded parts themſelves, and not in any ſtricture of thoſe through which they paſs, ſtill the impropriety of warm applications muſt be equally obvious, as by the rarefaction they induce, they muſt always tend to produce an additional degree of ſwelling in the contents of the hernial tumor.

Independent, however, of any theoretical reaſoning, I can with certainty aver, that in practice, much more advantage is obtained in diſorders of this kind, from cooling applications, than from thoſe of an oppoſite nature. In different inſtances I have ventured on the application of ice and ſnow, ſometimes with evident advantage, and I never ſaw them do harm *. But in general, the remedies I depend moſt on here, are, cold ſaturnine ſolutions, and cloths kept conſtantly moiſt with a mixture of cold water and vinegar.

By a proper application of one or other of the remedies now mentioned, or by a due combination of all of them, many caſes of hernia are relieved without any farther aſſiſtance: But it frequently happens, notwithſtanding every endeavour, that the protruded parts

* By ſome writers, this practice has been conſidered as hazardous; but I find it recommended by others to whom much credit is due, particularly by the late Dr. Monro. See his works, 4to edition, p. 559.

parts cannot be returned; the ſymptoms, inſtead of abating, become more violent; and the event of the diſeaſe is of courſe rendered more doubtful.

In this ſituation, when no probability remains of ſucceſs from the employment of the means already mentioned, the diviſion of the parts producing the ſtricture is then our only reſource.

This, it may be remarked, is one of the niceſt points in practice that a ſurgeon has ever to determine upon: I mean the exact period at which, in caſes of hernia, the more gentle means ſhould be laid aſide, and the operation be put in practice. If a ſurgeon, without having given a full trial to all the uſual remedies, ſhould early in the diſorder proceed to the operation, and if unfortunately it ſhould not ſucceed, he would probably be blamed by the friends of the patient as the principal cauſe of his death; and again, even allowing a recovery to be obtained, he is apt to be blamed, not only by his brethren of the profeſſion, but by the patient himſelf, for having made him ſuffer an unneceſſary degree of pain.

In ſuch a ſituation a practitioner often finds himſelf much embarraſſed. But we ought to be directed here, as in every critical caſe we are employed in, by the reſult of experience only; and if this rule is adhered to, inſtead of tedious delays uſual in every caſe of ſtrangulated hernia, we will have recourſe to the operation much earlier than is uſually done.

This operation, as is the caſe indeed with every other of equal importance, is no doubt attended with ſome hazard; but the danger accruing from it has by moſt practitioners been more magnified than it ought to be: For although no perſon of character can in any caſe of hernia be ſuppoſed to have recourſe to it before other means have been tried; yet ſo far as from experience I am able to judge, the riſk attending the diſorder itſelf when the operation is long delayed, is infinitely

infinitely greater than is commonly experienced from the effects of the operation conſidered abſtractedly.

Were we able from the attending ſymptoms to determine the exact period at which the operation ought to be performed, no kind of difficulty would occur from it; but this is ſo far from being the caſe, that the moſt experienced practitioner cannot with any certainty decide upon it. In ſome inſtances, herniæ with every ſymptom of ſtrangulation, continue for ſix, eight, or ten days; and after all, the protruded parts are at length replaced, and the patient does well; and in many ſimilar caſes when the operation has been the means of relief, although the very worſt ſymptoms have ſubſiſted for ſeveral days, yet on laying the parts open, no appearances either of inflammation or gangrene have been detected.

On other occaſions, again, the ſame ſet of ſymptoms, with perhaps no greater degree of ſwelling or tenſion in the parts affected, end fatally in a very ſhort ſpace of time. In ſome ſuch inſtances, the rapid progreſs of the diſorder is very ſurpriſing; the ſpace of eight and forty hours hardly intervening, from its firſt attack till the patient's death: I have even known the inteſtines become perfectly gangrenous in the courſe of one day from the time of their firſt expulſion.

Every practitioner muſt be ſenſible, that this is the real ſtate of the queſtion; and if it is ſo, it muſt at once become evident, that conſiderable delays muſt in ſuch critical circumſtances be always attended with great hazard; and as the real danger to be apprehended from the operation itſelf, is trifling when compared to the riſk which long delays uſually produce, it ought therefore, I think, to be laid down as an eſtabliſhed maxim, Always to proceed to the operation, if in the ſpace of a very few hours bloodletting and the other remedies pointed out, do not prove effectual. Two or three hours at fartheſt, even when the aſſiſt-

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ance of practitioners is early applied for, is perhaps the greateſt length of time that ſhould ever be conſumed in trials of this nature.

In the treatment of herniæ, it is certain, that French ſurgeons are uſually more ſucceſsful than the generality either of German or Britiſh practitioners; and ſo far as I know, no reaſon can be aſſigned for the difference, but that the French in almoſt every inſtance proceed more early to the operation than the ſurgeons of almoſt any other nation. They will thereby, no doubt, perform it frequently on patients who might have recovered by more gentle means; but any inconvenience ariſing from this circumſtance to a few, is fully compenſated by the number of lives which muſt be ſaved by having recourſe to the operation in due time, and which in all probability would otherwiſe have been loſt.

Although for very obvious reaſons the reduction of every caſe of hernia ought to be attempted when that can be done with propriety, yet it frequently happens that particular circumſtances occur which effectually debar us from every reſource of this nature.

When once a hernial ſwelling has been properly reduced, it is in general in the patient's power to prevent any return in future, by keeping a proper bandage conſtantly applied to the opening from whence the parts were protruded. But it often happens from inattention to this circumſtance, that ruptures which might at firſt have been eaſily cured, come at laſt by repeated deſcents, and by the great quantity of parts that fall down, to form tumors of ſo great a magnitude, in proportion to the opening through which they were protruded, that no art can replace them by the more ſimple means of reduction.

Independently, too, of the great degree of bulk to which tumors of this kind ſometimes arrive, ſuch adheſions frequently take place, between the viſcera forming the ſwelling and the ſurrounding parts, as render

render their return altogether impracticable by any other means than by the operation. By this laſt mode, indeed, almoſt every caſe of hernia may be reduced; but however neceſſary this operation may be when a patient's life is in danger, as it is always attended with ſome degree of riſk, it ought never to be put in practice where ſymptoms of ſtrangulation do not actually exiſt.

In that chronic ſtate of hernia we have been juſt deſcribing, although by intereſted and ignorant practitioners the operation has been often propoſed as a radical cure, yet no ſurgeon of character would in ſuch circumſtances ever think of adviſing it: He would reſt ſatisfied with preventing any accumulation of feces in the inteſtines, by preſcribing a proper diet and the occaſional uſe of gentle laxatives; and with obviating any inconvenience which might ariſe from the weight of the tumor, by the application of a proper ſuſpenſory bandage.

By theſe means alone, large tumors of this kind are often rendered very ſupportable for a great length of time; the circulation of the parts contained in the ſwelling goes freely and regularly on, as well as the periſtaltic motion of ſuch parts of the alimentary canal as have been protruded; and hence it is that we have many inſtances of large portions of the gut falling down even to the bottom of the ſcrotum, and continuing there for a great number of years without producing any interruption whatever to the uſual diſcharge by ſtool.

In this ſituation, therefore, of the diſeaſe, the operation can never become admiſſible. But although people labouring under this ſtate of the complaint, do frequently enjoy very good health, and ſometimes feel little or no inconvenience from the ſwelling, yet it muſt not be ſuppoſed that their ſituation is altogether free from danger: On the contrary, it is very certain, that on many occaſions, ſwellings of this kind which

have ſubſiſted for a great length of time without being productive of much trouble, do at laſt inflame and turn painful, ſo as to produce every bad ſymptom commonly obſerved from the real ſtrangulation of a gut. As long, too, as a ſwelling of this nature remains, as the opening through which the parts have been protruded is thereby effectually prevented from cloſing, ſo the patient is always liable to deſcents of other portions of inteſtine which have not formerly been down, and which may be productive of the moſt fatal ſymptoms. But what we here wiſh to eſtabliſh is, that till once theſe bad ſymptoms do actually occur, either from an affection of that part of the gut which has been long down, or of a portion more recently protruded, no ſuch operation as the one in queſtion ought to be employed. All that can be done with propriety in ſuch caſes, is, to fit the patients with proper ſuſpenſory bandages; to warn them of the riſk they are conſtantly liable to; and to caution them againſt violent exerciſe, particularly leaping, and every ſudden exertion.

Although with regular practitioners this circumſtance cannot require much diſcuſſion, yet the public at large is much intereſted in it. The former know well, that the operation ſhould not be performed in any caſe of hernia where violent ſymptoms do not render it neceſſary; but the latter, by not being able to judge of the various circumſtances which ought to be taken into conſideration, are too frequently impoſed upon by that numerous ſet of Itinerants with which every country abounds. By theſe a variety of operations are put in practice for performing what they call a radical cure of theſe diſorders; by which they mean to ſay, a prevention of future deſcents.

But as no remedy with which we are acquainted, a well adapted truſs only excepted, can be depended on for this purpoſe; and as all the other means put in practice for it, are not only painful, but in general

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are productive of much danger; the magiſtracy of every community ought to interfere in ſuppreſſing them.

The object in view by every attempt of this nature, is, either to effectuate the entire deſtruction of the hernial ſac, or at leaſt to procure an accretion of its ſides; which, by ſuch as are ignorant of the anatomy of the parts concerned, has been conſidered as capable of preventing any returns of the diſorder in future; and for the production of which, various methods have been invented.

In order to effect a total deſtruction of the ſac, our forefathers employed not only the knife, but the potential and even actual cauteries; and with a view to produce a firm union of its ſides, which was conſidered as equally effectual, it was afterwards propoſed by practitioners of more tender feelings, to employ the needle and ligature, or what was termed the Royal Stitch: And for the ſame purpoſe was invented the famous *punctum aureum*, which was performed in the following manner. After reducing the inteſtines into the abdomen, the ſac was laid bare with a ſcalpel; and a piece of gold wire being paſſed round its upper end, the wire being likewiſe made to include the ſpermatic cord, it was then ordered to be twiſted with a pair of forceps to ſuch a degree of tightneſs as to prevent the deſcent of the gut, but not to interrupt the circulation in the ſpermatic cord.*

But none of theſe methods being found to anſwer, for even the actual cautery, when carried perhaps to the depth of the bone itſelf, did not ſecure the patient againſt a return of the diſorder, our modern pretenders have therefore ventured to improve upon the ignorance of ancient practitioners, and actually go the length of deſtroying not only the hernial ſac, but even the teſtis alſo: Without any knowledge of the anatomy of

* For a more particular account of theſe various modes of practice in the different kinds of hernia as employed in former times, ſee the writings of Albucaſis, Paulus Ægineta, Fab. ab Aquapendente, Hildanus, Parey, &c.

of the parts, and having no characters to ſuffer from whatever conſequences may enſue, they proceed without fear; and, by promiſing all that patients can hope for, they are ſure to be every where well received. In conſequence of this, in every large town, many operations are performed by them; numbers accordingly are for certain mutilated, and many thereby even loſe their lives. Their method of proceeding is ſhortly this: They lay bare the hernial ſac, and having reduced the prolapſed parts, a ſtrong ligature is paſſed round both the ſac and ſpermatic cord, and is drawn ſo tight as to deſtroy effectually, not only the paſſage along the ſac, but the cord itſelf, and of courſe the teſticle. On ſome occaſions matters go no farther; but on others, ſuch a degree of inflammation has been induced, as to terminate in the patient's deſtruction.

If any of theſe means, however, was to be productive of the effect propoſed, viz. the prevention of every future deſcent of inteſtine, the riſk incurred would be in ſome meaſure compenſated by the advantage received: But the fact is much otherwiſe; for unleſs a truſs be kept conſtantly applied, the patient continues liable to a return of the diſorder in nearly the ſame degree as if no operation had been performed. Even the operation for the hernia itſelf, does not, as has been ſuppoſed, fortify the parts againſt a return of the diſorder, the continued uſe of a truſs being juſt as neceſſary after that operation as if it had not taken place.

I have dwelt longer on this circumſtance than may be thought neceſſary by thoſe who are much converſant in this part of practice; but as it is certain, that even of late years much miſchief has been done by Itinerants in the various ſpecies of hernia, and as they ſtill continue to impoſe upon the public, I thought it neceſſary to put the unwary on their guard againſt the effects of their knavery and ignorance.

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Plate VIII.

Fig 1.

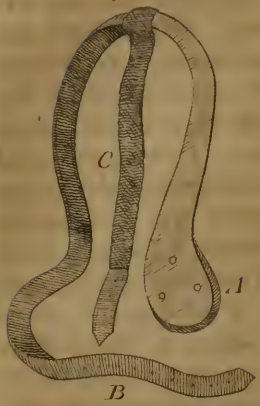

Fig 2

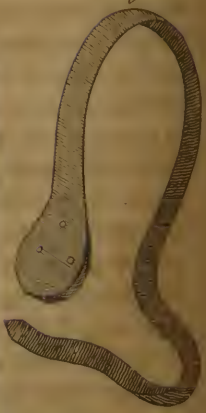

Fig. 3.

Fig. 4.

In plate VIII. are repreſented a variety of truſſes for different ſpecies of hernia. Thoſe here delineated are intended for the more uſual kinds of hernia, viz. the inguinal, crural, and umbilical. When others are wanted for particular parts, ſome ingenious tradeſman in that line of buſineſs ſhould be applied to, with directions to fit the inſtrument with the niceſt exactneſs to the parts for which it is intended. Indeed, the good effects of every bandage for this complaint, depend ſo much upon the exactneſs with which it is made to fit, that without the utmoſt nicety in this reſpect, it muſt always do more harm than good; for the ſole purpoſe of a bandage in caſes of hernia, is to prevent effectually the falling down of ſuch parts as have been newly replaced: If therefore the pad or bolſter of the bandage does not bear properly againſt the opening upon which it is placed, a portion of gut may ſlip out, and be thus materially injured by the preſſure of the pad. I have met with different inſtances of this kind, where bandages by not being exactly fitted did much miſchief; and every practitioner muſt have obſerved them: It is therefore a matter of the firſt importance, that tradeſmen be ordered to pay much attention to this circumſtance. Every bandage uſed for this purpoſe ought to be of the ſteel ſpring kind; for thoſe compoſed of linen and other ſoft materials, can never be kept properly applied. Even in infancy the ſteel bandages, when properly made, are in general uſed with eaſe and ſafety: But at any rate, when they cannot be got to apply exactly, which in early childhood is ſometimes the caſe, no dependence ought to be placed upon any other; for they always fret and gall the parts to which they are applied, and I never knew them in any one inſtance to anſwer the purpoſe.

Having premiſed theſe general obſervations, which relate equally to every variety of the diſorder, and by which frequent repetitions will be rendered unneceſſary,

ſary, we ſhall now proceed to the more particular conſideration of the different ſpecies of hernia; and firſt of the Bubonocele.

SECTION II.

Of the Bubonocele.

TOGETHER with the general ſymptoms of ſtrangulated hernia which we have lately enumerated, and to which we muſt here refer, the particular appearances of the bubonocele, or inguinal hernia, are, a ſoft ſomewhat elaſtic ſwelling, beginning in the groin, and deſcending by degrees into the ſcrotum in men, and into the labia pudendi, in women. When a portion of gut forms the tumor, it commonly feels tenſe, and this always in proportion to the degree of ſtricture that occurs in the opening of the tendon; and when any inflammation takes place, the leaſt degree of handling or preſſure always gives pain.

When the hernia contains omentum only, the ſwelling is both more ſoft, compreſſible, and more unequal, than when gut alone is down; the ſcrotum becomes more oblong, and of courſe leſs round, than in an inteſtinal hernia; and when the quantity of omentum is large, it is alſo much more weighty than a gut rupture of the ſame ſize: But in many caſes, perhaps in the greateſt proportion of all hernial ſwellings, the tumor is compoſed of both gut and omentum; and then the diſtinguiſhing ſymptoms of each can never be ſo clearly marked. In books, various ſymptoms are enumerated, for diſtinguiſhing the contents of every ſpecies of hernia; but whenever the caſe is any degree complicated, every candid practitioner muſt acknowledge, that no certainty as to this point can be obtained till the tumor is fairly laid open.

As there are ſome diſorders with which the inguinal and ſcrotal hernia may be confounded, practition-

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ers ought to be as much acquainted with their characteriſtic marks as poſſible. Theſe complaints are, glandular or other ſwellings in the groin, whether from the venereal diſeaſe or any other cauſe; that ſpecies of ſweiling termed Hernia Humoralis; and all the different kinds of hydrocele.

The venereal bubo and other ſwellings in the groin, are readily diſtinguiſhed from hernia, not only by the abſence of all the general ſymptoms of hernia, but by that incompreſſible hardneſs with which all ſuch ſwellings are at firſt attended, and by the fluctuation of matter which in their ſuppurated ſtate is always obſervable.

In the hernia humoralis, or ſwelling of the teſticle, the hardened and enlarged ſtate of the teſticle itſelf, as well as of the epididymis; their being exquiſitely painful to the touch; the tumor being remarkably heavy in proportion to its bulk; and the ſpermatic proceſs being commonly very free from ſwelling; are in general pretty certain marks of diſtinction. In the hernia humoralis, too, the inteſtines are free and unobſtructed, and the other general ſymptoms of hernia as formerly pointed out are wanting.

In the hydrocele of the tunica vaginalis teſtis, the tumor in general is more equal to the feel than in hernia: In the former the ſwelling always begins in the under part of the ſcrotum, and proceeds upwards: Whereas the very reverſe occurs in herniæ. Except in caſes of very enlarged hydrocele, the ſpermatic proceſs is always perfectly free and diſtinct; whereas in every caſe of hernia where the tumor deſcends to the ſcrotum, the ſpermatic cord cannot in any part of its courſe be diſtinguiſhed. In a hydrocele, a fluctuation of a fluid is diſtinguiſhable; in a hernia it is otherwiſe.

From the anaſarcous ſwelling of the ſcrotum, or hydrocele of the dartos as it is termed, hernia is very readily diſtinguiſhed; and indeed the means of diſtinc-

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tion are ſo obvious, that they need not be here enumerated; but there is another ſpecies of hydrocele, viz. the hydrocele of the ſpermatic cord, which on ſome occaſions it is no eaſy matter to diſtinguiſh from hernia, and which therefore requires particular attention.

The ſpecies of hydrocele, where the water is collected in one or more cells of the ſpermatic proceſs, now and then begins in the under part of the cord, and proceeds upwards; and in ſuch caſes, this circumſtance alone is a ſufficient means of diſtinction between it and hernia, in which the ſwelling always proceeds from above downwards; but it ſometimes happens, that the ſwelling in this kind of hydrocele begins even within the opening in the abdominal muſcle, and by degrees falls downwards. In ſuch inſtances, it is altogether impoſſible from the ſtate of the tumor merely, to ſay whether it is the one diſeaſe or the other. The general ſymptoms of hernia, ſuch as pain and tenſion of the abdomen, obſtructed inteſtines, &c. muſt be particularly attended to: And as theſe do not occur in any ſpecies of hydrocele, when they happen to take place they will commonly throw much light on the real nature of the diſeaſe. In ſome caſes, however, theſe and every other means of diſtinction are wanting; but even in ſuch circumſtances a prudent practitioner will never run any riſk, either of hurting his patient, or of affecting his own reputation; which the miſtaking a Hernia for a Hydrocele, and treating it as ſuch, muſt always do; and which, to the diſgrace of Surgery, has on ſome occaſions actually happened.

In all ſuch caſes, where any degree of doubt occurs, as well as in every caſe of tumor in the teſticle where the moſt perfect certainty is not obtained, and when it is neceſſary to have recourſe to an operation, the ſurgeon ought to proceed as if the diſorder was a real hernia: By doing ſo, every riſk will be avoided; and on the tumor being laid cautiouſly open, the true

nature

nature of the diſeaſe will be then rendered evident, and the practitioner accordingly will be at liberty to apply the means beſt ſuited for its removal. Whereas by adopting a contrary method, and by treating as a Hydrocele what afterward turns out to be a true Hernia; independent of any injury to his own reputation, he runs a very great riſk of deſtroying his patient.

In the treatment of the Bubonocele, when the various means we have recommended when treating of hernia in general are employed without ſucceſs, the ſurgeon is then under the neceſſity of proceeding to the operation; and the method of doing it is this.

A table of a convenient height being placed in a proper light, the patient muſt be laid upon it with his head and body almoſt horizontal, whilſt at the ſame time his buttocks are ſomewhat elevated by pillows laid beneath them. The legs hanging over the edge of the table ought to be ſeparated ſo as to admit the operator between them; and ſhould in that ſituation be firmly ſecured by an aſſiſtant on each ſide, who ſhould take care to keep the thighs ſo far raiſed, as to relax all the abdominal muſcles.

In order to afford as much empty ſpace as poſſible for the return of the protruded parts, the patient ſhould be adviſed to empty his bladder entirely; and the parts having been previouſly ſhaved, an inciſion muſt now be made with a common round edged ſcalpel through the ſkin and part of the cellular ſubſtance, beginning at leaſt an inch above the ſuperior end of the tumor, and continuing it down to the moſt depending part of the ſcrotum. Even although the tumor does not extend to the bottom of the ſcrotum, the parts ſhould be laid open in this manner. By a free external inciſion we are enabled to finiſh the operation with more eaſe and freedom than when the firſt opening is not ſo large; it does not produce much more pain than a ſmall inciſion; and by being continued to the bottom of the ſcrotum, the matter produc-

ed in the upper part of the ſore is prevented from collecting below, which it is otherwiſe ready to do.

The operator now goes on to divide ſlowly the reſt of the cellular ſubſtance, together with ſome tendinous kind of bands, which, unleſs the diſorder is very recent, are univerſally met with, either looſe upon the ſurface of the hernial ſac, or, on ſome occaſions, paſſing as it were into its ſubſtance. Even this external inciſion of the teguments ought to be made with great caution: For although in by much the greateſt proportion of hernial ſwellings, the ſpermatic veſſels lie behind the protruded parts, yet on ſome occaſions they have been found on the anterior part of the tumor; ſo that in order to avoid the riſk of wounding them, as ſoon as the ſkin is divided the remainder of the operation ought to be done in the moſt cautious manner, care being taken to avoid every large blood veſſel that makes its appearance.

This circumſtance of the prolapſed parts getting down behind the ſpermatic veſſels, has never, ſo far as I know, been taken notice of in books; it muſt therefore be a very rare occurrence. As I met with it, however, in one caſe, where the fact was exceedingly evident, the poſſibility of its happening I have therefore no reaſon to doubt. If we attend only to the uſual conformation of theſe parts, the hernial ſac, we would ſay, ought never to get behind the ſpermatic cord: But we know well, that in no part of the human body is nature more apt to deſert her ordinary courſe, than in ſome circumſtances relating to the teſticles and their blood veſſels. We have already obſerved, that till near the period of delivery, the teſticles continue in the abdomen; and about that time, fall down in a gradual manner to the ſcrotum. Many inſtances, however, occur, of both teſtes remaining in the abdomen through life: Sometimes one remains, and the other falls into the ſcrotum. On other occaſions, one or both fall into the groin, and never proceed

ceed farther; a circumſtance which every young practitioner ſhould be aware of, as inſtances have occurred of a teſticle remaining in the groin being miſtaken for a hernia, and of much pain and diſtreſs being produced by different attempts made for their reduction. Now, if ſuch varieties as theſe occur in the mechaniſm of theſe parts, why may not nature in ſome inſtances produce ſuch a conformation as may, in the event of a hernial ſac falling into the ſcrotum, bring the ſpermatic cord, and even the teſticle itſelf, into a ſituation anterior to the protruded parts? I ſhall not here enter into the diſcuſſion of the manner in which ſuch a circumſtance may be produced; but, as I am certain that the fact has happened, and as it may therefore occur again, I conſider it as an additional argument for the propriety of dividing the hernial ſac in the cautious manner here directed*.

In making this firſt inciſion of the ſkin, it is uſual to do it by pinching up the teguments, and then dividing them with a ſcalpel; but no ſurgeon of ſteadineſs and dexterity will ever think it neceſſary to proceed in this manner: For this inciſion of the ſkin is done with much more neatneſs, and with equal ſafety, by the operator graſping the tumor with his left hand, in ſuch a manner as to render the teguments on the anterior part of it as tenſe as poſſible, while with the ſcalpel in his right hand he divides the ſkin from one end of the ſwelling to the other.

The diviſion of the ſkin and cellular ſubſtance being continued in the manner directed till the ſac is laid bare, an opening muſt be made in it ſo as to bring its contents into view; and the moſt ſafe place for ſuch an opening is, not about the middle of the tumor, as is commonly directed, but as near to the under

* Since this went to the preſs, I find that a ſimilar inſtance is recorded by Le Dran, in his *Treatiſe on Ruptures* of the ſpermatic veſſels having been found on the anterior part of a bubonocele.—Such a ſituation, therefore, of theſe veſſels, is perhaps more frequent than is commonly imagined.

under point of it as poſſible: It is here done with as much eaſe as in any other part; and beſides, the gut is ſeldom if ever found juſt at the bottom of the ſac, which is commonly occupied with a quantity of bloody ſerum; ſo that the riſk of wounding it there is much leſs than in any other part of the ſwelling. In making this perforation into the ſac conſiſts the greateſt nicety in the operation, the utmoſt caution being neceſſary to avoid wounding the parts protruded from the abdomen. Good eyes and a ſteady hand are in no operation more requiſite than in this: With theſe, any practitioner acquainted with the anatomy of the parts may be ſure of doing the operation properly, and without them the beſt anatomiſt muſt undoubtedly go wrong.

With the ſame ſcalpel that divided the ſkin and cellular ſubſtance, the operator muſt proceed ſlowly, dividing one fibre of the ſac after another, till there is reaſon to think that the whole ſubſtance of it is cut through. This may be always diſcovered by means of the blunt end of a probe: If it paſſes in eaſily, we may conclude with certainty that the ſac is divided; and if it does not, the inciſion muſt be continued in the ſame gradual manner ſomewhat farther, when the ſame trial with the probe muſt be again made.

In proſecuting this diviſion of the ſac, a good deal of aſſiſtance is obtained from the uſe of a ſmall ſharp pointed directory, open at the extremity, as is repreſented in Plate IX, fig. 3. By puſhing the end of this inſtrument below ſome of the fibres of the ſac, they are thereby ſeparated from the parts underneath, and may be thus divided with more ſafety than in any other manner; and in the ſame way the remaining parts of the ſac muſt be divided, till this part of the operation is finiſhed*.

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* In the 4th Volume of Memoirs of the Paris Academy of Surgery, there is a very ingenious paper on Herniæ by Monſieur Louis. But although there are many uſeful obſervations communicated in this

In almoſt every caſe of hernia where the tumor is confined to the groin, and even where the ſwelling extends to the ſcrotum if the parts are recently protruded, the hernial ſac is found very thin, and in ſuch caſes is always ſoon cut through ; but it is neceſſary for the information of young practitioners, to obſerve, that in hernial ſwellings of long ſtanding, the ſac frequently becomes ſo very thick, as to require much more diſſection than beginners commonly expect : By going on, however, in the cautious manner we have directed, every riſk of wounding any material part may be avoided.

As ſoon as an opening is made quite through the ſac, a circumſtance of which we are made certain, as was already remarked, by a probe paſſing eaſily in, it ought then to be farther enlarged, till it is of ſuch a ſize as to admit the fore finger of the operator's left hand.

The finger being now introduced, is to be uſed as a director for entering the narrow blunt pointed biſtoury, repreſented in Plate VII, with which the ſurgeon is to divide the hernial ſac along its whole length from below up to the opening in the external oblique muſcle. By means of the finger as a director for the biſtoury, this part of the operation is performed with perfect ſafety ; and the biſtoury here delineated, renders the many complex inſtruments formerly employed

this treatiſe, Mr. Louis in one point I think has gone far wrong, in ridiculing that degree of caution ſhown by ſome ſurgeons in dividing the hernial ſac : The diviſion of the ſac, he ſays, is attended with ſo little difficulty, that he does not conſider it as different in that reſpect from the firſt external inciſion of the ſkin. His words are : " Jamais le ſac ne m'a donné ni plus de peine, ni plus d'embarras que la peau ; on diviſe, pour ainſi dire, celle-ci du *premier trait*, et le ſac *du ſecond*." In the hands of ſuch an expert operator as Mr. Louis, the ſcalpel even in this manner may be ſo managed as to do no harm, but with the general run of practitioners much miſchief would be produced by proceeding in this part of the operation ſo rapidly as is here directed. And when we reflect that the difference of a few ſeconds in the courſe of the operation, is all that could be gained by the greateſt diſpatch we can employ, little doubt, I think, can remain as to the propriety of proceeding through every part of it in the moſt deliberate manner.

ed not only for this part of the operation, but for the ſubſequent diviſion of the tendon, quite unneceſſary.

On laying the ſac open at the bottom, a quantity of coloured fluid always ruſhes out, and the protruded parts now come fully into view: If a portion of gut is down, and is not much entangled with omentum, by being now ſet at liberty it puſhes out immediately on the ſac being opened; thereby giving the appearance of having been collected in a larger quantity, than the ſize of the tumor gave reaſon to expect.

The portion of gut found in hernial ſwellings is very various, no part of the inteſtinal canal being entirely exempted from falling down. Hitherto the ileum has been commonly ſuppoſed to form the ſubſtance of the greateſt proportion of ſuch tumors; later and more accurate obſervation, however, renders it probable, that the cæcum, appendix vermiformis, and part of the colon, are perhaps as frequently contained in herniary ſacs as any other portion of the gut.

The ſac being laid fully open, the parts contained in it ought now to be examined with the niceſt attention, in order to diſcover whether they are all ſound or not; and if upon an attentive inſpection they are found to be ſound, that is, if they are not evidently in a gangrenous ſtate, even although they do ſeem to be conſiderably inflamed, every endeavour ſhould be uſed to get them immediately returned into the abdomen.

In making the reduction, whether inteſtine or omentum, or a portion of each, have been found contained in the ſwelling, thoſe parts of them which appear to have come laſt out, ought to be firſt puſhed back; the difficulty and trouble of returning them being thereby much leſſened: And in making the reduction, it both anſwers the purpoſe better, and is leſs likely to do miſchief, to apply the fingers to that part of the inteſtine connected with the meſentary than to the convex part of the gut. While the reduction is going on, the patient's thighs and loins, ſhould be ſtill more elevated

vated than they were during the preceding ſteps of the operation; as this poſture of theſe parts tends much to facilitate the return of the protruded inteſtines to the abdomen.

When the diſeaſe is recent, and the parts have not been frequently down, it ſometimes happens, that by pulling out a little more of the gut than was formerly in the ſac, any obſtruction which occurred to its being replaced is thereby removed; and if the protruded parts are not of great bulk, they may thus be ſometimes reduced, without any neceſſity for enlarging the opening through which they have paſſed from the abdomen: But when upon trial this cannot be done with great eaſe, it ſhould never be attempted; much more danger being to be dreaded from any degree of force uſed for the reduction of the gut, than can ever occur from finiſhing the operation by an enlargement of the opening in the tendon of the external oblique muſcle.

As the tendon of this muſcle runs in an oblique direction from above downwards, and as the opening through which the contents of a hernia protrude, is formed merely by a ſeparation of the tendinous fibres from one another, the direction of this opening is of courſe the ſame with that of the tendon; that is, it runs ſomewhat obliquely from the ſpine of the ileum to the os pubis.

In enlarging this paſſage, then, for the reduction of ſuch parts as have paſſed through it, as a tranſverſe ſection of the tendon is by no means neceſſary, the knife ſhould be carried obliquely upwards, ſo as merely to continue the natural ſeparation of the tendinous fibres.

The finger was recommended as the beſt director for the knife in opening the ſac, and in dividing the tendon it is equally neceſſary. By inſinuating the finger into the aperture in the tendon immediately above the protruded parts, the point of the blunt biſtoury is

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eaſily introduced upon it; and in this manner, by keeping the end of the finger always a little before the biſtoury, the opening may be enlarged to any neceſſary extent without any riſk of wounding the contiguous parts.

In general, a very ſmall enlargement of the natural opening in the tendon is found ſufficient for the reduction of the gut and other parts: But the ſize of the opening ought by all means to be fully ſufficient for the end propoſed; for it is better to exceed in making it ſomewhat too large, than to run any riſk of hurting the parts by forcing them through a very ſmall aperture.

If upon introducing the finger any adheſions of the gut to the contiguous parts are diſcovered, the inciſion in the tendon ought to be larger than might otherwiſe be neceſſary, in order that the finger may be freely admitted ſo as to deſtroy ſuch adheſions as it can reach; for unleſs they are removed, complete ſucceſs from the operation cannot be expected.

Independently of ſuch adheſions internally, it frequently happens, by long confinement in the ſcrotum; preſſure; and perhaps other cauſes; that ſtrong adheſions are formed among the parts contained in the ſac itſelf; and before they can be with propriety reduced, it is always neceſſary to attempt to ſeparate them.

When adheſions of this kind occur, as they ſometimes do, between different parts of the protruded gut, the greateſt caution is neceſſary in ſeparating them: But connections of this nature between one portion of the inteſtinal canal and another, are ſeldom very firm, and are commonly eaſily ſeparated by the fingers alone; and when the connection is formed by means of long filaments, which is ſometimes the caſe, the eaſieſt method of removing them is to cut them, either with a pair of ſciſſors or the biſtoury: But when it is found, that one part of a gut adheres ſo firmly to

another

another as not to be ſeparated but with difficulty, it is much better to return the whole even in that ſtate into the abdomen, than to run the riſk of hurting the inteſtine materially by uſing much force.

When, again, adheſions occur between the gut and the hernial ſac, or between the gut and omentum, if the filaments producing the connection cannot be otherwiſe removed, as there is no great hazard in wounding the omentum, and ſtill leſs in hurting the ſac, a very ſmall portion of theſe may be diſſected off, and returned with the gut into the abdomen; and in the ſame manner, when the omentum adheres ſo firmly to the ſac as not to be ſeparated in any other manner, no danger can ever accrue from the ſac being ſomewhat encroached upon.

The riſk and trouble attending the practice now recommended is nothing, at leaſt it is very trifling, when compared to the inconveniences that would enſue from leaving either the omentum or gut adhering externally to the hernial ſac, as is adviſed by ſome writers when ſuch adheſions cannot be very eaſily divided. The ſmalleſt portion of gut being left down, would run a great riſk of ſuffering by expoſure to an unuſual degree of cold, and to the effects of the external air at the different dreſſings; and by leaving part of the omentum to protrude through the opening from the abdomen, one great advantage to be expected from the operation would be loſt, viz. the prevention in future of that riſk which a patient with a portion of protruded omentum is always liable to, of a piece of gut ſlipping down, and perhaps of becoming ſtrangulated.

After returning the contents of the ſac into the cavity of the abdomen, it has been propoſed by ſome authors, to paſs a ligature round the upper part of the ſac juſt at its neck, with a view, as we are told, of procuring a reunion of its ſides, in order that it may

ſerve as a means of preventing future deſcents of the bowels.

But as ſuch a ligature cannot be applied without much riſk of injuring, or even of deſtroying the ſpermatic veſſels, with which the poſterior lamella of the ſac is immediately connected, the practice from that conſideration alone ought to be laid aſide; but in reality it does not appear to be in any degree neceſſary, as this very union of the ſides of the ſac is univerſally produced merely by that degree of inflammation which always ſucceeds to the diviſion of it by this operation.

Hitherto we have recommended the immediate reduction of the contents of hernial tumors upon the ſuppoſition that they have been only diſplaced; that they have been adhering to one another or to the neighbouring parts; or perhaps that they have been more or leſs in a ſtate of inflammation. But when it appears that this inflammation has already terminated in gangrene, as the return of ſuch mortified parts, whether of omentum or inteſtine, might be exceedingly hazardous, a greater degree of caution becomes neceſſary.

When the omentum is found in a mortified ſtate, as the exciſion of a portion of this membrane is not attended with much riſk, it has been the common practice to cut away the diſeaſed parts; and in order to obviate any inconvenience from the hemorrhagy which might enſue, we are adviſed to make a ligature on the ſound parts previous to the removal of thoſe that are mortified; whilſt the ends of the ligature being left hanging out of the wound, the ſurgeon has it in his power to remove them when circumſtances appear to render it proper.

Theſe ligatures on the omentum, however, having frequently been productive of bad conſequences, ſuch as nauſea, vomiting, cough, fever, pains in the belly, and inability to ſit erect; and it having been found by

by the experience of many individuals, that no hemorrhagy of any importance ever occurs from a diviſion of this membrane even in a ſound unmortified ſtate; ſuch parts as have become gangrenous may therefore be freely cut off, and the remaining ſound parts be afterwards without the intervention of ligatures introduced into the abdomen with no riſk whatever. This is now the opinion of different practitioners *: But if it ſhould ever happen, on cutting off part of the omentum, that a veſſel of any ſize is divided, a ligature may with great ſafety be paſſed about the veſſel itſelf, without including any of the membrane; and the ends of it being left long enough to hang out at the wound, the threads may be afterwards pulled away at pleaſure.

Another circumſtance ſometimes occurs, too, which renders the removal of part of the omentum neceſſary; when a rupture has been of long duration, and a conſiderable portion of caul has remained long down, from the preſſure made by the uſual ſuſpenſory bandage and other circumſtances, it frequently happens that conſiderable quantities of the protruded parts become much thickened, very hard, and collected into lumps. When theſe lumps are not very large, there is no neceſſity for removing them, as when ſmall they may be returned into the abdomen without producing any inconvenience; but whenever it appears to the operator, that by their bulk and hardneſs they might probably do miſchief if reduced into the belly, they ought as certainly to be cut off as if in a ſtate of real mortification.

When it is determined to remove any part of the omentum, the eaſieſt and ſafeſt method of doing it is this. The membrane ought to be carefully expanded

* A very accurate paper upon this ſubject may be ſeen in the 3d Vol. of Memoires de l'Academie Royalle de Chirurgie of Paris, by Monſieur Pipelet, in which ſeveral caſes are related of the bad effects produced by ligatures on the omentum.

Mr. Pott is alſo of this opinion.—Vide Treatiſe on Ruptures.

ed at the part intended to be cut; and in this ſtate it is very eaſily divided by a pair of thin edged ſciſſors, much more ſo indeed than by any other inſtrument. When fully ſpread out, any turn of the inteſtine that happens to be enveloped in it, is at once brought into view, which without this precaution we would run a great riſk of dividing by the ſciſſors.

When, again, a portion of gut is found to be mortified, if it ſhould be returned in that ſtate, a diſcharge of feces would certainly take place into the cavity of the abdomen, as ſoon as the mortified ſpot ſhould ſeparate from the ſound. In order to prevent ſuch an occurrence, which would ſoon terminate in the patient's death, if it is a ſmall ſpot only that is diſeaſed, we ought to endeavour by means of a needle and ligature, to connect the ſound part of the gut immediately above the mortified ſpot, to the wound in the abdominal parietes. By this means, when the mortified part ſeparates, or on its being immediately cut out, which is perhaps better, the feces are diſcharged by the wound; and different inſtances have occurred, where the loſs of ſubſtance produced by the mortification was not extenſive, of the opening into the gut becoming gradually leſs, and at laſt healing entirely: But whether the event ſhould prove ſo fortunate or not, whenever a portion of gut is obſerved to be completely mortified, it ought by all means to be ſecured by a ligature to the parts moſt contiguous to the wound.

And farther, when the mortified portion of gut is of great extent, and includes, ſo far as it goes, the whole circumference of the inteſtine, the gangrenous parts of it ought to be cut out at once; and if the quantity thus taken away is not ſo conſiderable as to prevent the ends of the gut from being brought into contact with one another, it ought to be immediately effected in the manner we ſhall direct in another chapter when treating of Gaſtroraphy. This at leaſt affords a

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chance of the ends of the gut being brought to reunite; and if unfortunately that event ſhould not take place, as the gut ought here alſo to be connected to the parts contiguous to the wound in the abdomen, a paſſage for the feces will ſtill be ſecured by the groin.

Although in caſes of hernia, attended with a mortification of the inteſtines, many have recovered by the method we have recommended who otherwiſe muſt have died; yet it will be readily ſuppoſed, that the riſk attending patients in ſuch a ſtate muſt be very great: But although a ſmall proportion only of ſuch as are unfortunately in this ſituation ſhould recover, yet ſtill no practitioner would be excuſable for omitting thoſe means which afford the greateſt probable chance of a recovery. A patient of my own is now living, and in good health, voiding his feces by the anus, who loſt at leaſt one foot of the inteſtinal canal by mortification in a caſe of crural hernia; and we are told by different authors, of ſimilar recoveries equally remarkable.

It is to the moderns chiefly, we muſt remark, that this very material improvement in the treatment of hernia is to be attributed. It is even recorded of Rau, who lived in a very late period, that on opening a hernial ſac, where a gangrenous ſtate of the parts was detected, as the caſe was conſidered as deſperate, he laid down his knife and proceeded no farther in the operation. This patient, who died next day, would in modern practice have had at leaſt ſome chance for life.

When it is therefore diſcovered, that part of the contents of the ſac are mortified, all ſuch portions as are to be removed ought to be cut off; and the remaining ſound inteſtine being retained till properly ſecured by a ligature, the opening in the external oblique muſcle may then be dilated with ſafety: Whereas, if it ſhould be enlarged before the diſeaſed part of the gut is taken away, the gangrenous portion might very

very probably ſlip up together with the ſound; but by the precaution now recommended, every riſk of this nature is prevented.

The parts forming a hernia being all completely replaced, when the ſac in which they were contained is found thick, hard, and much enlarged, as in ſuch a ſtate no good ſuppuration can take place, and as its preſervation cannot be in any degree uſeful, ſuch parts of it as can be cut away with propriety ought to be removed: All the lateral and fore parts of the ſac may be cut off with ſafety; but as it is commonly firmly connected with the ſpermatic veſſels behind, this part of it ought not to be touched.

The operation being now finiſhed, by the protruded parts being replaced, and thoſe intended to be removed being cut off in the manner directed, the remaining ſore muſt be dreſſed as lightly as poſſible with charpee of the ſofteſt kind; and the beſt bandage for retaining the dreſſings, is the uſual ſuſpenſory bag properly ſtuffed with ſoft lint.

The patient on being carried to bed ſhould be ſo placed as to have his loins ſomewhat elevated above the reſt of his body, and ſhould in that ſituation be immediately laid to reſt: Opiates are here particularly uſeful: To prevent, or at leaſt to moderate, the fever which commonly ſucceeds, the patient ſhould be kept cool; in plethoric habits, bloodletting ſhould be preſcribed, together with a rigid low diet; and laſtly, a frequent uſe of gentle laxatives, ſo as to keep the belly moderately open, is particularly proper.

When however the conſtitution has been previouſly much reduced, either by long ſickneſs or any other cauſe, inſtead of bloodletting and a low diet, a nouriſhing regimen ſhould be preſcribed; for if a patient in ſuch circumſtances be not properly ſupported, he will not ſo readily recover from the effects of the diſorder: And it is proper to remark, that in ordinary practice, the indiſcriminate uſe of bloodletting, and

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an abſtemious regimen, in every caſe of hernia, appears to be too rigidly adhered to; for although this practice proves always more effectual than any other means in every caſe of rupture attended with inflammation, yet daily experience convinces us of its being highly pernicious where the ſyſtem has been already much reduced by evacuations, and where no inflammatory ſymptoms take place.

The ſore being regularly dreſſed as often as it appears neceſſary in the ſame eaſy manner as at firſt, and the ſame degree of caution being continued both with reſpect to diet and other circumſtances, if the patient ſurvives the firſt three or four days he will in general recover: And as ſoon as the ſore is firmly cicatrized, a truſs ought to be properly fitted to the parts, and ſhould never in any future period of life be laid aſide.

By many it has been recommended, and it is ſtill a very common practice, to ſtitch up the wound with two or three ſutures; but as no real advantage can be obtained from this, and as it has been on ſome occaſions productive of miſchief, it ought not to be attempted. No perſon will probably ſay, that ſuch ligatures ought to be carried ſo deep as the tendon of the oblique muſcle; and if they are only made to paſs through the external teguments, they can have no effect in preventing a protruſion of inteſtines: On the contrary, it does now and then happen, during the cure of the wound after this operation, that ſmall portions of gut paſs out at the opening in the tendon, which are always readily ſeen and eaſily reduced when the external parts have not been drawn together; but on the ſkin being by ligatures made to cover the greateſt part of the wound, I have known it more than once happen, that portions of inteſtines have paſſed out at the opening in the tendon, and remain protruded for a conſiderable time without being noticed; ſo that the practice ought not to be encouraged.

After

After laying the ſac bare, it was ſome time ago recommended by Mr. Petit and other French practitioners, to endeavour to reduce the protruded inteſtine without dividing the ſac. One great advantage expected from this, was, the prevention of thoſe bad conſequences which are ſuppoſed will moſt likely enſue from the external air finding acceſs to the contents of the abdomen.

It ought to be remembered, however, that unleſs the hernial ſac is laid open, we cannot poſſibly know in what ſtate the protruded bowels are; ſo that parts might be returned into the abdomen in ſuch a ſtate of diſeaſe as would add greatly to the patient's riſk. Not only the inteſtines are liable to mortification, but collections are apt to occur in the hernial ſac, of a very fetid putrid ſerum, which, on being puſhed into the abdomen, might be productive of much miſchief. And beſides, it has ſometimes happened, that, on laying open a hernial ſac, the cauſe of ſtrangulation has been detected, either in the entrance to the ſac itſelf, or among the parts protruded along with it: For although, in a great proportion of all the inſtances of hernia that occur, a ſtricture of the paſſage in the external oblique muſcle is to be conſidered as the cauſe of all the bad ſymptoms, yet now and then inſtances of the contrary are obſerved; one of which I met with ſome years ago, and I have heard of others of the ſame kind.—In a caſe of ſcrotal hernia of long ſtanding, ſymptoms of ſtrangulation at laſt ſupervened; and on laying open the ſac, the appendix vermiformis was found ſo tightly twiſted round a portion of gut, as left no reaſon to doubt of that circumſtance alone having been the cauſe of all the miſchief. If the parts had here been returned into the abdomen without dividing the ſac, no advantage whatever would have occurred from the operation; and, after death, the practitioner would have had the mortification to find, that, in all probability,

probability, the patient's life might have been ſaved, if this very neceſſary meaſure had not been omitted.

Inſtances of the protruded parts being returned into the abdomen without opening the ſac, are enumerated by different French authors; and in ſome of theſe which ended fatally, it was found on diſſection, that ſtrangulation of the gut had been occaſioned by ſtricture formed by the parts contained within the ſac, and not by the tendon of the external oblique muſcles.

Diſaſters of a nature ſimilar to theſe we have mentioned, having on different occaſions occurred to Mr. Petit and others who had adopted the practice of returning the parts contained in the ſac without dividing the ſac itſelf, it has now accordingly been very generally laid aſide. Even Mr. Petit himſelf was at laſt ſo convinced of the inconveniences reſulting from it, that he is ſaid to have joined keenly with thoſe who had oppoſed it from the time of its being firſt introduced.

By ſome authors again, it is adviſed, to reduce not only the protruded bowels, but even the hernial ſac itſelf, without opening it; whilſt, by others, it is alleged, that the ſac can never be reduced. Mr. Louis, in the paper we have already quoted, is clearly of this laſt opinion, as Mr. Pott alſo is. But we have the teſtimony of different authors of credit, and particularly of Mr. Le Dran, to the contrary; and I have myſelf met with one inſtance of this, where the appearances were ſo unequivocal as to leave no doubt with me reſpecting it.

In caſes of hernia where the parts have been long and repeatedly down, ſuch firm adheſions are uſually formed between the ſac and the contiguous parts, as to reduce them apparently into one inſeparable maſs; ſo that, in ſuch circumſtances, reduction of the ſac becomes altogether impracticable. But although this is perhaps in every inſtance found to be the caſe in ruptures of long continuance, we are by no means warranted in ſuppoſing that it is ſo in every caſe of re-

cent hernia. We know that the adheſion of one part of the body to another, cannot any where be inſtantaneouſly produced. Even where recent diviſion has taken place, and when the divided parts are kept in cloſe contact, the ſpace of ſeveral days is commonly required to effect a firm reunion. Now in the caſe of a portion of membrane being forced into a natural opening, where the parts are neither rendered raw by art, nor are as yet affected with inflammation, a ſtill longer period we may ſuppoſe will be neceſſary for this effect; and in fact, although I ſuppoſe there is ſcarce an inſtance of a hernial ſac of long duration being reduced, yet there are ſundry indiſputable facts which ſhow, that in recent ruptures the ſac may be returned. The one above alluded to, which occurred in an operation at which I was preſent ſeveral years ago had been down five or ſix days, and formed a tumor in the groin of the ſize of an egg: The ſac did not in any point ſeem to adhere; the operator therefore found no difficulty in reducing it; and on diſſection after death, which happened in about two days from the operation, the paſſage through the external oblique muſcle was found dilated, but no exiſtence of a ſac could be traced into it. It is not, however, my own opinion, that this is a matter of much importance in practice, I mean the practicability of reducing the hernial ſac or not; for, the various reaſons we have already given, againſt the propriety of returning the contents of a ſac without opening it, occur with equal force againſt the propoſed practice of returning the ſac itſelf unopened. But as there is a poſſibility of future experience deriving ſome advantage from this circumſtance, it is certainly right to have the fact as clearly eſtabliſhed as poſſible.

Hitherto we have been ſuppoſing the diſorder to exiſt in a male ſubject only; but as the ſame openings in the external oblique muſcle are met with in females,

females, ſo they are alſo liable to the ſpecies of rupture we have juſt been deſcribing.

In males, however, the bubonocele is obſerved to occur more frequently than in women, and as in them too the cellular membrane ſurrounding the ſpermatic veſſels is very lax and dilatable, ſo hernial ſwellings of this kind are commonly much larger in men than in women. But inſtances do now and then occur of ſuch tumors even in women becoming very large; in ſuch caſes, the protruded parts fall down to the very bottom almoſt of the labia pudendi.

As the openings in the external oblique muſcles of females are exceedingly ſimilar to thoſe in male ſubjects, ſo the treatment of this ſpecies of hernia is in them very ſimilar to what is found to anſwer in men. In caſes of ſtrangulated gut, when glyſters, bloodletting, and the other remedies formerly enumerated, happen to fail, the ſame operation of laying open the hernial ſac, and of enlarging the opening in the tendon of the oblique muſcle, is here equally proper as in the other ſex.

With modeſt women, diſorders of this kind often take place without the practitioner in attendance being made acquainted with them; whenever therefore ſuch ſymptoms of colic occur as give reaſon to ſuſpect the exiſtence of hernia, a particular examination ought always to be made, in order if poſſible to detect the cauſe of the miſchief, from the removal of which a cure can alone be expected.

SECTION III.

Of the Hernial Congenita.

BY attending to the anatomical deſcription given in the firſt ſection, of the parts chiefly concerned in caſes of hernia, it muſt evidently appear, that in the ordinary ſpecies of ſcrotal hernia, the parts protruded from

from the abdomen muſt of neceſſity be contained in a bag or ſac perfectly diſtinct from the teſticle; which in that kind of rupture is always found in its uſual ſituation in the ſcrotum, ſurrounded by its own proper membrane the tunica vaginalis, and not in contact with any other part whatever.

We then made it appear too, that if in early infancy a portion of gut ſhould ſlip down by the ſame paſſage with the teſticle, that the parts ſo protruded muſt be in immediate contact with the teſtis, and muſt thus be ſurrounded with the tunica vaginalis; ſo that in this ſpecies of rupture, very properly by Haller termed Hernia Congenita, the tunica vaginalis teſtis forms the hernial ſac.

The diſcovery of this ſpecies of hernia, which was reſerved for modern times, enables us to account for a number of caſes recorded in books of ſurgery, of the contents of ruptures having been found in the ſame bag with the teſticle: A circumſtance which, till this diſcovery, was always conſidered as a clear proof of the peritonæum being frequently ruptured in thoſe diſorders; as there was not otherwiſe a poſſibility of accounting for the phenomenon. But we now know, that the peritonæum in theſe caſes of hernia is never ruptured; and that the parts forming a hernial tumor being found in contact with the teſticle, is a circumſtance eaſily explained from our more accurate anatomical knowledge of thoſe parts.

In the treatment of ruptures of the congenital kind, little difference occurs from the management of the bubonocele in its more ordinary form. When the parts can be replaced without any operation, it ought always to be done, a truſs being at the ſame time recommended as a preventative of future deſcents; and when ſymptoms of ſtrangulation take place, which cannot be otherwiſe removed than by the operation, it here becomes equally neceſſary as in any other ſpecies of rupture.

When

When from the circumſtance of the parts having been protruded in early infancy, and from their having at times continued to fall into the ſcrotum from that period downwards, there is reaſon to ſuſpect that the hernia to be operated upon is of the congenital kind, the ſurgeon in ſuch a caſe, in laying open the contents of the tumor, muſt proceed with ſtill more caution than in caſes of ordinary rupture; for the tunica vaginalis which here forms the ſac, is commonly much thinner than the uſual ſac of herniæ. On the parts being returned, more attention is neceſſary too in dreſſing the wound than in other caſes of hernia; for the teſticle being here laid bare by its vaginal coat being cut open, if it is not treated with much delicacy it will very probably inflame, and may thereby be productive of much diſtreſs. The teſtis therefore ought to be immediately enveloped with its own proper covering, the looſe tunica vaginalis; and at every dreſſing, care ſhould be taken to prevent as effectually as poſſible every acceſs to the external air.

In other reſpects the management of the hernia congenita is perfectly ſimilar to that of any other rupture.

SECTION IV.

Of the Crural *or* Femoral Hernia.

THE ſeat of this ſpecies of hernia, as we have elſewhere remarked, is on the upper and anterior part of the thigh; the protruded parts paſſing out at the ſame opening through which the large blood veſſels of the thigh are tranſmitted from the abdomen.

In the deſcription given in a former ſection, of the external oblique muſcles of the abdomen, the under edge of theſe muſcles, it was remarked, by doubling backwards, forms a kind of ligament, which extends in an oblique direction from the ſpine of the ileum near to the ſymphiſis pubis. It is this under border of

of theſe muſcles which is commonly known by the name of Poupart's or Fallopius's ligament.

Excepting at its two extremities where this ligament is attached to the pubes and ileum, it is not in any other part connected with bone. By the particular ſhape of the ileum at this part, a kind of arch is formed by the ligament paſſing over a hollow in that bone through which the large artery and veins of the thigh find a paſſage, the reſt of the cavity being filled up with cellular ſubſtance, glands, and fat; and all theſe parts again are covered and tied down by a firm tendinous aponeuroſis of the faſcia lata of the thigh.

It is under the tendon or ligament juſt now deſcribed, that the parts compoſing a crural hernia deſcend. On ſome occaſions they paſs immediately over the femoral artery and vein; on others, they are found on the outſide of theſe veſſels; but more frequently they lie on the inſide, between them and the os pubis.

As the protruſion of any of the abdominal contents produces in this ſituation nearly the ſame ſet of ſymptoms as occur in caſes of inguinal hernia, the method of treatment recommended in that ſpecies of the diſeaſe is alſo applicable here.

When, therefore, in the femoral hernia, ſymptoms of ſtrangulation occur, we muſt put all the remedies in practice already adviſed for the inguinal rupture: Only here, in attempting to reduce the parts by the hand, the preſſure ſhould be made directly upwards, inſtead of obliquely outwards, as we directed in the other; and when theſe means are unfortunately found to fail, the operation itſelf muſt then be employed.

A free external inciſion was inculcated in caſes of inguinal hernia; and it is here equally neceſſary, or even more ſo, from the parts concerned being more deeply ſeated than in the other. By too much timidity in making the external inciſion, the operator is frequently

frequently much incommoded in all the subsequent steps of the operation. The external cut should extend at least from an inch above the upper end of the tumor to the same space below the most depending part of it.

The membrana adiposa, tendinous expansion of the fascia lata, and hernial sac, being all cautiously divided, if the protruded parts are found in a situation proper for reduction, we should immediately attempt to replace them; and as the space below the ligament through which they have passed is considerable, this may frequently be done without dividing the ligament, merely by pressure properly applied with the hand, while the patient's body is placed in the posture we have already directed in the bubonocele as being best suited for favouring a return of the bowels.

When in this manner the contents of the tumor can be reduced without the necessity of dividing the ligament, the patient is thereby saved from a great deal of hazard, as from the particular situation of the spermatic vessels and epigastric artery with respect to this ligament, any cut made into the substance of the latter, runs a very great risk of dividing one or other of them.

The spermatic vessels as they go along to pass out at the opening in the external oblique muscle, run nearly upon the very edge or border of Poupart's ligament almost through its whole length, so that I consider it as impossible to make a free division of the ligament without cutting them across.

We have been advised indeed by some, in order to avoid wounding the spermatic vessels, which they acknowledge would certainly happen if the incision should be carried directly upwards, to cut in an oblique direction outwards. In this method, they allow, that the epigastric artery, from the course it usually takes, may very probably be divided: But the risk attending the division of that artery they do not consider

conſider as of much importance; and if the diſcharge of blood occaſioned by any wound that may be made in it ſhould happen to be conſiderable, they ſpeak of it as a very eaſy matter to take it up by a needle and ligature, and needles of various ſhapes have been invented for this purpoſe. Even in emaciated people, however, it is a matter of much difficulty to reach the epigaſtric artery, and in corpulent patients it will be found altogether impoſſible to ſurround it with a ligature; ſo that the younger part of the profeſſion ought to be very cautious in receiving the directions uſually given on this ſubject. On reading the remarks of the late Mr. Sharpe upon this point*, to ſecure the epigaſtric artery by means of a ligature, one would expect to be the eaſieſt of all operations; but the difficulty which in reality attends it, is ſuch as muſt convince every one who has tried it, that Mr. Sharpe himſelf had never put it in practice.

But even although this accident of wounding the epigaſtric artery could be guarded againſt in the moſt eaſy and effectual manner, yet I will venture to ſay, when a femoral hernia is of any conſiderable ſize, the diſtention of the ligament thereby produced muſt bring the ſpermatic veſſels ſo nearly on a line with the under border of the ligament, as to render it altogether impoſſible to divide the one without the other; and whoever will examine theſe parts in the ſtate we have now deſcribed, will ſee that this cannot be avoided, whether the inciſion be carried directly upwards, or even obliquely outwards or inwards.

Some authors, from being ſenſible of the danger attending this part of the operation, have propoſed merely to dilate the paſſage, inſtead of dividing the ligament; and Mr. Arnaud, a French writer on this ſubject, delineates a curved levator for the purpoſe of ſupporting the ligament till the protruded parts are reduced: But as we are to ſuppoſe in every caſe of ſtrangulated

* Critical Inquiry into the preſent ſtate of Surgery.

gulated hernia, that the paſſage through which the parts have fallen down is already dilated to nearly its utmoſt poſſible extent, in ſuch a ſituation to attempt a farther dilatation without the aſſiſtance of the knife, would ſeldom, it is probable, be productive of any advantage.

A conſiderable time ago it occurred to me, that in this part of the operation ſome aſſiſtance might be derived from performing it in the following manner; and having ſince had occaſion to make trial of it in one caſe where it anſwered moſt effectually, I can now therefore recommend it with ſome certainty. Inſtead of dividing the ligament in the ordinary way, I only made an inciſion into part of its thickneſs: In order to protect the parts below, I firſt inſinuated the fore-finger of my left hand between the gut and the ligament; and then with a common ſcalpel made a cut of about an inch in length, beginning above and proceeding to the under border of the ligament.

The firſt ſcratch with the ſcalpel was very ſlight; but by repeated touches, it was made to penetrate almoſt through the whole thickneſs of the ligament, till at laſt a very thin lamella only of it remained: The finger being now withdrawn, the protruded parts were returned with great eaſe, the ligament at its weakened part yielding gradually as the neceſſary preſſure was applied for the reduction of the inteſtines.

As in this manner the opening may be enlarged to any neceſſary extent, and as the ſpermatic veſſels and epigaſtric artery are thus effectually avoided, the operation for this ſpecies of hernia may not only be done with equal certainty, but with the ſame degree of ſafety, as for any other kind of rupture. For, by not penetrating with the ſcalpel through the whole thickneſs of the ligament under which theſe blood veſſels lie, they are thereby kept free from all kind of danger during this part of the operation; and, the preſſure to be afterwards uſed for the reduction of the protruded

parts, if done in an eaſy gradual manner, as it ought always to be, can never injure them materially; as blood veſſels of the ſize and ſtrength of which theſe are, eaſily admit of a degree of extenſion much more conſiderable than can be here required.

The femoral hernia being in other reſpects perfectly ſimilar to the inguinal, and the mode of treatment applicable to the one, being in every other circumſtance equally ſo to the other, it is not neceſſary to ſay any thing farther here concerning it: Only we may remark with reſpect to bandages for retaining the dreſſings, both in this and every other ſpecies of hernia, except in the bubonocele, as laſt deſcribed, in which the ordinary ſuſpenſory bandage of the ſcrotum anſwers the purpoſe in a very eaſy effectual manner, that in no other ſituation can a bandage be applied, without being productive of much inconvenience. For inſtance, the Spica, as it is termed, which after the operation of the crural hernia, uſed always to be employed, can never be applied but with much difficulty; nor does it anſwer the purpoſe properly: Inſtead of this or any other bandage, a piece of thin leather ſpread with any plaſter moderately adheſive, being applied over the dreſſings, retains them more effectually, and with much more eaſe.

We have elſewhere remarked, that from the particular conformation of the parts concerned in this diſeaſe, which is found to take place in females, that women are more liable to it than men. In them the ſame means of relief, and the ſame mode of operating, ought to be employed as we have already adviſed for male ſubjects. For, as the ſame riſk occurs here of wounding the epigaſtric artery, the ſame precautions are neceſſary for avoiding it; and by attending to the directions we have given upon this point, this may be always done with certainty.

SECTION

SECTION V.

Of the EXOMPHALOS, *or* UMBILICAL RUPTURE.

IN this ſpecies of hernia, the parts protruded from the abdomen paſs out at the umbilicus; and the contents of the hernial ſac are here, as in every other kind of rupture, exceedingly various. On ſome occaſions they conſiſt of inteſtines only; ſometimes of omentum only; and frequently of both. At other times, again, part of the ſtomach, the liver, and even the ſpleen, have been found in the ſac of an umbilical rupture.

As all the parts we have now mentioned, are, while in the abdomen, contained in the peritoneum, the hernial ſac, it is evident, muſt be here formed as well as in other ruptures, by that membrane being carried along with ſuch parts as are protruded. Accordingly, in every recent inſtance of umbilical hernia, this ſac is in general very evident; but when the tumor has become conſiderable in ſize, by a long continuance, and the great weight of its contents, the ſac, by the preſſure thus produced, becomes ſo connected with the neighbouring parts, that by many it has been doubted whether this ſpecies of hernia has a ſac or not. In ruptures of this kind the ſwellings ſometimes increaſe to ſuch a degree, as actually to burſt the ſurrounding parts; not only the ſac, and cellular ſubſtance, but even the ſkin itſelf.

This diſorder occurs moſt frequently in infancy, ſoon after birth; and corpulent people are more liable to it than thoſe of a contrary habit, from this evident reaſon, that in the former, by the great bulk of contained parts, the ſurrounding muſcles are kept conſtantly diſtended, and the opening at the umbilicus through which the parts are protruded, is thereby made more pervious: For the ſame reaſon too, women

en in the laſt months of pregnancy are particularly liable to umbilical rupture.

If the diſorder is attended to in due time, a bandage properly fitted to the parts will commonly effect a a cure; and, in ſuch ſwellings as occur in pregnancy, a removal of the diſorder, is, in general, a certain conſequence of delivery. But even in caſes of umbilical hernia in pregnant women, by employing a bandage on the firſt appearance of the diſeaſe, and by perſevering in the uſe of it for a proper length of time, although a cure may not be obtained till delivery, the diſorder will at leaſt be prevented from receiving any farther increaſe. Both in male and female patients, due attention to the uſe of a truſs is abſolutely neceſſary in every caſe of hernia; but as in this ſpecies of the diſeaſe the ſwelling and different ſymptoms are always greatly aggravated by pregnancy, women in that ſtate ought to be particularly attentive to the ſmalleſt appearance of every ſwelling of this nature.

Although in ſome inſtances of umbilical ruptures, different portions of the alimentary canal are found to be protruded; yet by experience we know, that the omentum alone is much more frequently protruded than any of the other viſcera: And hence umbilical herniæ in general, are not productive of ſuch bad ſymptoms as uſually occur in the other kinds of rupture.

It happens, however, as we have already obſerved, that in ſome caſes a portion of gut alone is puſhed out, by which the uſual ſymptoms of a ſtrangulated hernia are apt to be induced. In which event, when the means uſually employed for returning the gut into the abdomen do not ſucceed, as a ſtricture of the paſſage through which the gut has fallen, is to be conſidered as the cauſe of the diſorder; ſo a cure, it is evident, muſt depend entirely on a thorough removal of that ſtricture. In performing this operation, a free external inciſion along the courſe of the tumor, is

the

the firſt ſtep to be taken; and on laying the protruded parts bare by a cautious diviſion of the ſac, if they are found in a ſtate proper to be returned, and if that cannot be effected without making an enlargement of the paſſage into the abdomen, this may be done with great ſafety by introducing the finger, and enlarging the opening as far as is neceſſary with the blunt pointed biſtoury. This inciſion, we may remark, may be made with almoſt equal ſafety in any direction; but leſt the ligament formed by the umbilical veſſels ſhould be wounded, which, however, would not probably occaſion much injury, yet if any perſon is apprehenſive of danger from that circumſtance, it may be always avoided by making the inciſion on the left ſide of the umbilicus, and carrying it a little obliquely upwards and outwards.

When, again, the prolapſed parts, on being laid open, are found to be ſo far diſeaſed as to render their reduction improper, the directions formerly given for the treatment of ſimilar occurrences in other caſes of hernia, apply with equal propriety here, ſo that they need not now be repeated.

By Albucaſis, Guido, Aquapendens, and other authors, it has been propoſed, with a view to obtain a radical cure without having recourſe to the operation, to lift up the ſkin covering the tumor, with the finger and thumb, ſo as to ſeparate it from the gut underneath; when a ligature is ordered to be applied round the parts ſo held up, and to be made of ſuch a tightneſs as to induce a mortification of all the parts that lie anterior to it.

In other inſtances again, when the form of the ſwelling did not admit of this, the ſame precaution being taken as we have directed above for avoiding the gut, a needle containing a double ligature was introduced at the baſis of the tumor, near to its centre, and the ligatures were afterwards tied one above and the other

other below, of ſuch a degree of tightneſs as to induce the wiſhed for effect.

But as the practice thus recommended was not adequate to the deſign propoſed, as it did not prevent a return of the diſorder, and as the deſtruction of ſkin produced by it rendered every future deſcent more dangerous; ſo it is now, at leaſt by regular practitioners, very univerſally exploded.

SECTION VI.

Of Ventral Herniæ.

IN this ſpecies of hernia the parts forming the ſwelling are protruded between the interſtices of the abdominal muſcles. No part of the abdomen is altogether exempted from the occurrence of ſuch tumors, but they are moſt frequently obſerved in ſome of the parts moſt contiguous to the linea alba; and when the ſtomach alone happens to form the tumor, the ſwelling is ſituated juſt under, or immediately to one ſide of the xiphoid cartilage.

The treatment of this kind of rupture correſponds exactly with that of exomphalos. When the parts are reducible by the hand merely, a cure may be frequently obtained by the conſtant uſe of a truſs; and, again, when ſymptoms of ſtrangulation occur, which cannot be otherwiſe removed than by an inciſion through the ſtricture, this muſt be done in the manner directed in the laſt Section, ſo as to admit of the parts being replaced. The after treatment of the parts concerned in the operation, is the ſame here as in other kinds of rupture.

SECTION VII.

Of the Hernia *of the* Foramen Ovale.

IN this variety of rupture, the viſcera protrude through the foramen ovale of the pubis and iſchium.

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It is not by any means a frequent diſorder; but, as it does ſometimes occur, it is neceſſary here to deſcribe it.

The ſymptoms in this kind of hernia being very ſimilar to thoſe produced by the ſtrangulation of inteſtines in other parts, it is not neceſſary to enumerate them: Only it is proper to remark, that in this rupture the tumor is in men formed near to the upper part of the perinæum; and in women, near to the under part of one of the labia pudendi. In both ſexes it lies upon the obturator externus, between the pectinæus muſcle and the firſt head of the triceps femoris.

The foramen ovale being partly filled up by a membranous or ligamentous ſubſtance, and in part by the obturatores muſcles, it was commonly ſuppoſed that this ſpecies of hernia aroſe from a relaxation of one or other of theſe; but as an opening is left in the foramen for the tranſmiſſion of different blood veſſels and nerves, it is now known, that in this diſorder the viſcera paſs out at that opening, by gliding down in the courſe of theſe veſſels.

The general mode of treatment as we formerly recommended for other ſpecies of hernia, muſt be here attended to; and when the parts are reduced, a truſs properly adapted to the parts, muſt be truſted to for their retention. But as it will ſometimes happen in this, as in every other caſe of hernia, that reduction cannot be effected by the hand alone, in that event the operation of dilating the paſſage through which the inteſtines protrude, is the only reſource. The tumor, however, that occurs in this diſorder, being in general ſo ſmall as ſcarcely to be noticed but by the moſt minute examination, unleſs a local pain, with the uſual ſymptoms of a ſtrangulated gut lead to its detection, it is ſeldom diſcovered from its ſize, until it is too late to expect much aſſiſtance from art.

But whenever the operation becomes neceſſary, as it muſt always be when ſymptoms of ſtrangulation are diſcovered

diſcovered to have ariſen from a portion of gut being protruded, and which cannot by any other means be removed; in ſuch an event, after carefully laying the prolapſed parts freely bare, if they cannot then be reduced but by dilating the paſſage, and as death muſt be the certain conſequence if that ſhould not be effected, it ought at all events to be attempted: But as here it is almoſt impoſſible to enlarge the opening by means of any ſharp inſtrument, without dividing ſome of the blood veſſels which paſs out at the foramen; and as ſuch an occurrence, from theſe veſſels being of a conſiderable ſize, would of itſelf, in all probability, end in the patient's death, the depth and ſituation of the parts rendering the application of a ligature impracticable; it is more adviſable, by means of ſuch a flat hook as is repreſented in Plate IX, fig. 2, to dilate the paſſage to a ſufficient ſize by gentle gradual ſtretching. By inſinuating the end of the hook between the inteſtine and ligament, and pulling it gradually from without inwards, a degree of dilatation may be obtained ſufficient for the reduction of the gut, without incurring that hazard which the diviſion of the ligament with the knife or any ſharp inſtrument muſt always occaſion.

SECTION VIII.

Of the HERNIA CYSTICA, *or* HERNIA *of the* URINARY BLADDER.

IN this ſpecies of rupture, the urinary bladder is the organ protruded; and the ſituations in which it occurs, either in the groin and ſcrotum, through the opening in the external oblique muſcle of the abdomen; in the fore part of the thigh, under Poupart's ligament; or in the perinæum, through ſome of the muſcular interſtices of that part.* Inſtances have occurred,

* An inſtance of this is recorded in Vol. IV. of Memoires de l'Academie Royale de Chirurgie, by Monſ. Pipelet le Jeune, p. 181.

curred, too, of the bladder being puſhed into the vagina, ſo as to form hernial tumors of no inconſiderable degrees of magnitude.

As only a part of the bladder is covered with the peritonæum; and as the bladder, in order to get into the opening in the external oblique muſcle, or under the ligament of Fallopius, muſt inſinuate itſelf between that membrane and the abdominal muſcles; it is evident, that the hernia cyſtica cannot be covered with a ſac, as inteſtinal ruptures uſually are. In the perinæum, again, that portion of the bladder moſt liable to fall into it, is in no way connected with the peritonæum. On ſome occaſions, this ſpecies of rupture occurs by itſelf, without any complication; and on others it is found to be accompanied with inteſtines and omentum, both in inguinal and femoral herniæ: When complicated with a bubonocele, that portion of the bladder which is protruded lies between the hernial ſac and ſpermatic cord; that is, the inteſtinal hernia lies anterior to it.

The uſual ſymptoms of this ſpecies of hernia are, A tumor, attended with fluctuation, either in the groin, in the fore part of the thigh, or perinæum, which generally ſubſides when the patient voids urine. When the ſwelling is large, before water can be made with freedom, it is commonly neceſſary to have recourſe to preſſure, at the ſame time that the tumor, when in the groin or thigh, is as much elevated as poſſible; but when the ſwelling is ſmall, and eſpecially when no ſtricture is as yet produced, the patient generally makes water with great eaſe, and without any aſſiſtance from external preſſure.

When a hernia of the bladder occurs without any complication, it is commonly found to proceed from a ſuppreſſion of urine. In the treatment, therefore, every cauſe of ſuppreſſion ought as far as poſſible to be guarded againſt; and when no adheſions take place, and if the protruded portion of bladder can be

reduced, a truſs properly fitted to the part, ſhould be wore for a conſiderable length of time: And, again, when the parts cannot be reduced as long as no ſymptoms occur to render the operation neceſſary, a ſuſpenſory bag, ſo fitted as effectually to ſupport the prolapſed parts, while at the ſame time it does not produce ſevere preſſure, is the only probable means of relief. When, again, a portion of bladder happens to protrude into the vagina, after reducing the parts, which is done by laying the patient on her back with her loins ſomewhat elevated, and preſſing with the fingers from the vagina, deſcents in future may in general be effectually prevented by the uſe of the preſſary repreſented in Plate IX, fig. 1. And the ſame means, we may remark, are employed with ſucceſs in preventing a falling down of part of the inteſtinal canal into the vagina; a ſpecies of rupture which now and then occurs.

It may happen, however, that the prolapſed parts, by being attacked with inflammation and pain in conſequence of ſtricture, may render the diviſion of the parts producing theſe ſymptoms as neceſſary in this as in any other caſe of hernia; in which event, the directions given in the preceding ſections for the treatment of inteſtinal herniæ, will be equally applicable here.—Only it muſt be remembered, that as in the hernia cyſtica without any complication, the protruded parts are not covered with a ſac; ſo a ſtill greater degree of caution is neceſſary in laying them bare, than in the ordinary kinds of rupture.

It ſometimes happens, that ſtones are produced in that portion of the bladder which remains protruded; in which event, if it ſhould ever become neceſſary to cut into them, if the bladder can be eaſily retained in its prolapſed ſtate till the wound is healed, it ought always to be attempted, in order to prevent that extravaſation of urine internally which would otherwiſe occur, and which in all probability would do miſchief.

Plate IX.

Fig. 1.

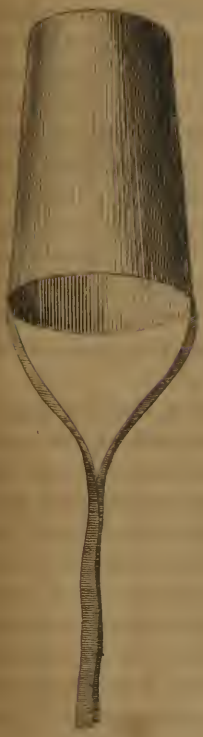

Fig. 2.

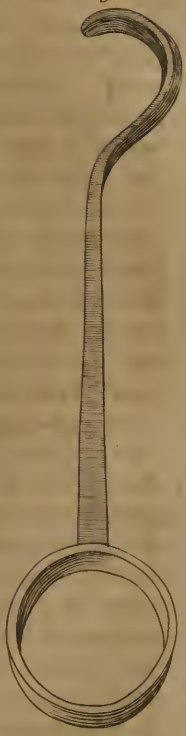

Fig. 4

Fig. 3.

miſchief. The ſame precaution, too, becomes neceſſary, if, either by accident in the operation for the hernial cyſtica, the bladder ſhould be cut into; or if any part of it has been found mortified, ſo as to render it improper to return it into its uſual ſituation*.

CHAP.

* The beſt accounts to be obtained of the various ſpecies of hernia may be had in the works of Le Dran, Heiſter, and of Mauchart in a treatiſe *De Hernia Incarcerata*; in the different volumes of *Memoires de l'Academie Royale de Chirurgie* of Paris, in the Medical Eſſays of Edinburgh; in the works of the late Dr. Monro; in Haller *De Hernia Congenita*, in his *Opuſcula Pathologica*; In Mr. John Hunter's very accurate account of the ſtate of the Teſtis in the Fœtus in Dr. Hunter's Medical Commentaries; and in Mr. Pott's valuable Treatiſe on ruptures. Theſe are the beſt modern authors on this ſubject; and very little ſatisfaction is to be got from any of the ancient writers upon it.

CHAP. VI.

OF THE HYDROCELE.

SECTION I.

General Remarks *on the* Hydrocele.

EVERY tumor formed by a collection of water, might, from the import of the word, be with propriety denominated a Hydrocele; but the chirurgical acceptation of the term, implies a watery ſwelling ſituated in the ſcrotum or ſpermatic cord.

Swellings of this kind, as well as every other ſpecies of tumor in the ſcrotum or groin not immediately produced by the protruſion of parts from the abdomen, are by ancient writers termed Falſe or Spurious Herniæ, in oppoſition to thoſe deſcribed in the laſt Chapter, which they diſtinguiſhed by the appellation of *True Herniæ*.

No real utility, however, is derived from this diſtinction; and as it aroſe from a very erroneous notion which prevailed of the origin of theſe diſorders, we ſhould not have thought it neceſſary to mention it here, but with a view to render intelligible the ideas of ancient writers upon this ſubject.

Indeed, the opinions concerning theſe diſeaſes, as handed down to us by all the older writers, by which I mean thoſe of the laſt and former centuries, are in general ſo confuſed and perplexed, that few of them are worth much attention; For, as they were very ignorant

ignorant of the anatomy of the parts concerned, the ideas they formed of the ſituation of the diſeaſes to which they are liable, were ſo erroneous, that the practice built upon them came to be very pernicious. So little were they acquainted with the ſtructure of theſe parts, that they proceeded with much unneceſſary dread in the treatment of their diſorders; for, by ſuppoſing an immediate connection to ſubſiſt between the coats of the teſticle, the cavity of the abdomen, liver, kidneys, and other viſcera, they were induced to conſider the collections of water that occur in the hydrocele, as depoſitions from theſe parts, and as tending to free them, and perhaps the ſyſtem at large, from ſome important diſorders. Different paſſages in Hildanus, Lanfranc, Fabricius, ab Aquapendente, and even in Dionis's works, ſhow this to have been the idea of practitioners in the times of theſe authors.

In conſequence of this, their practice became timid and undecided; ſo that every chirurgical operation, in which thoſe parts were concerned, became a matter of great importance to reſolve upon, and very tedious, painful, and uncertain in the execution.

From the time of Celſus to the middle of the laſt century, very little progreſs ſeems to have been made in reducing the knowledge of theſe diſeaſes to greater certainty. Indeed, from Celſus downwards, authors ſeem to have copied almoſt exactly from one another, till Wiſeman, Le Dran, Garengeot, and Heiſter, gradually elucidated the ſubject: But they were never clearly and accurately deſcribed, till the diſcoveries of Monro, Haller, Hunter, and Pott, rendered the anatomy of the parts concerned plain and intelligible. So much attention, however, is ſtill given to the confuſed accounts of theſe parts handed down by ancient writers, that the real nature of the diſorders of the teſticle and its appendages is leſs underſtood than it otherwiſe would be. There is no part, indeed, of chirurgical pathology, of which ſtudents in general are ſo

ignorant

ignorant as of this; and hence their notions of these diseases, and of the anatomy of the parts in which they are seated, are commonly very indistinct.—Nothing but a strict attention to the discoveries of late anatomists can convey clear and distinct ideas concerning them; and whoever will make himself thoroughly acquainted with these, will find, that the hydrocele, and other disorders to which these parts are liable, are explained with as much clearness and simplicity as any other disease incident to the human body.

We have already, in the beginning of the preceding Chapter on Herniæ, given a description of these parts, so far as related to that class of diseases. To what was then said, we must now beg leave to refer; but before proceeding to treat farther of the disorders now under consideration, we shall first enumerate such particulars relating to the structure of the parts concerned as were not formerly necessary to be mentioned.

In the anatomical description already given of these parts, we made it appear, that on the testes with their blood vessels descending to the groin and scrotum, as they were while in the abdomen surrounded by the peritonæum in the same manner with the other viscera, and as in their descent they bring a process of the peritonæum along with them, so when in the scrotum, that they still remain in the cavity of that membrane.

At the time of their falling down, and for a short while thereafter, a direct communication subsists along this process of the peritonæum between the testes and viscera in the abdomen; but soon after this, except, as we formerly observed, in the case of a congenital hernia, the superior part of the passage begins to contract, and in a short time is entirely obliterated, from the opening in the external oblique muscle down along the spermatic cord, to the upper part of the epididymis; the under part of the process continuing

loose

looſe and open. In this manner the inferior extremity of the proceſs is converted into a kind of bag, the tunica vaginalis teſtes.

From the deſcription formerly given of theſe parts it appears, that the teſtis while in the abdomen is at its back part firmly connected to the peritonæum, at which part the blood veſſels, nerves, and vas deferens, communicate with it; ſo when in the ſcrotum, as the vaginal coat with which it is there ſurrounded is evidently a proceſs or continuation of the peritonæum, it muſt of neceſſity be ſtill connected with that membrane in the ſame manner as while it remained in the abdomen. And accordingly we find, that although the teſticle lies looſe in this ſac or vaginal coat in every other part, yet all along its poſterior part it is firmly attached to it. At this part the different veſſels of the teſtis ſtill enter; and at this part the peritonæum, or what is now the tunica vaginalis, is reflected over it, thereby forming the tunica albuginea, or immediate covering of the teſticle; ſo that the latter, viz. the tunica albuginea, is demonſtrably a mere continuation of the former or vaginal coat.

The inferior part of the peritonæal proceſs being ſomewhat wider below than above, leaves the tunica vaginalis of a pyramidal form; and it is alſo ſomewhat longer than the teſtis, reaching from the ſuperior part of the epididymis, where it begins, to a little below the inferior point of the teſticle where it terminates. It is altogether of ſuch a ſize as to allow the teſtis to roll eaſily within it; its principal uſe appearing to be, to retain a ſmall quantity of a fine exhalation, which is conſtantly ſecreting, either from its own ſurface, or from the ſurface of the teſtis itſelf, for the purpoſe of keeping the latter moiſt and eaſy.

This vaginal coat which we have now deſcribed is the only looſe covering belonging either to the ſpermatic cord or to the teſtis: For although, by many writers on this ſubject, a vaginal coat of the cord is alſo

alſo deſcribed, together with a ſuppoſed ſeptum between it and the vaginal coat of the teſtis; yet no ſuch covering is, on diſſection, found to exiſt. The ſuperior part of the peritonæal ſpermatic proceſs, we have already ſeen, is entirely cloſed up very ſoon after the deſcent of the teſticle; and a firm adheſion being produced between the ſides of the ſac all along the courſe of the cord, no veſtige whatever can be traced, either of a vaginal coat of the ſpermatic cord, or of any particular ſeptum between that and the teſticle: This it is of ſome importance to attend to, as the diſeaſes of theſe parts cannot otherwiſe be properly underſtood.

As the diſeaſes we are now to treat of are chiefly ſeated in the coverings of the teſtis, we have been more particular in rendering their ſtructure clear and obvious, than is neceſſary in deſcribing the teſticle itſelf; with reſpect to which we ſhall only obſerve, that it is evidently very vaſcular, being compoſed almoſt entirely of different convolutions of blood veſſels.

Beſides the vaginal coat proper to each teſticle, the two teſtes have for their farther protection a more external covering, the ſcrotum: A bag formed almoſt entirely of ſkin and cellular ſubſtance; for that body the dartos, which has commonly been ſuppoſed to be muſcular, is now clearly proved to be altogether cellular.

Even the ſeptum ſcroti, or that membrane which divides one teſtis from another, is compoſed of cellular ſubſtance in a more condenſed ſtate. By air it is eaſily inflated, and it is equally pervious to water: So of courſe it partakes of all thoſe watery effuſions, to which the more external parts of the ſcrotum are liable.

It is very neceſſary to be acquainted with this ſtructure of the ſcrotum, as from the deſcriptions which till of late have been given of it, young practitioners are induced to conſider it as muſcular, and to ſuppoſe the ſeptum with its rapha to be ligamentous; and

hence

hence they are led to be more cautious than they need be in performing operations upon it.

We have thus entered with as much minuteneſs into the anatomy of theſe parts as is neceſſary for underſtanding their diſeaſes; and the nature of this undertaking not admitting of a more particular diſcuſſion, we ſhall now proceed to conſider the different ſpecies of the hydrocele; the immediate object of this chapter.

All the varieties of the hydrocele which have been mentioned by authors, may, I think, be comprehended under the two following ſpecies, viz. the anaſarcous, and encyſted. In the former, the water is diffuſed over all the ſubſtance of the part in which it is ſeated; the ſwelling is not collected in any particular cavity, but occupies equally all the cells of the part: In the latter, viz. the encyſted, the water is collected in one diſtinct bag; and a fluctuation of a fluid is in general perceptible to the touch.

The ſcrotum, with its contents the teſticle and its appendages, are liable to both ſpecies of the diſorder; and the ſpermatic cord with its coverings are alſo liable to both. We ſhall firſt treat of the ſcrotal affections of this kind.

SECTION II.

Of the Anasarcous Hydrocele *of the* Scrotum.

THE ſcrotum from being entirely cellular, and connected immediately with the trunk of the body, is rendered liable to partake of every diffuſable ſwelling with which the general conſtitution is attacked: And accordingly we find, that anaſarcous ſwellings of other parts of the body, ſeldom ſubſiſt for any length of time, without producing a ſimilar affection of the ſcrotum. A local anaſarcous fullneſs of the ſcrotum unattended with any general affection has on ſome occaſions

occaſions indeed been produced by a local cauſe; viz. by the accidental preſſure of a tumor on the lymphatics of the part; by external injury; and by an effuſion of urine from a rupture of the urethra: But ſuch occurrences are very rare, a general diſeaſe of the conſtitution being the uſual forerunner of ſuch tumors.

As ſoon as water is collected in any conſiderable quantity in the ſcrotum, a ſoft, inelaſtic, colourleſs tumor, is obſerved over the whole of it; preſſure of the finger or of any hard body is eaſily received, and the mark of ſuch preſſure is for ſome time retained by it: The ſkin at firſt preſerves its natural appearance; and the rugæ of the ſcrotum, which in a ſtate of health are always remarkable, are not for ſome time much altered; but as the ſwelling advances they gradually diſappear, till at laſt they are totally obliterated: The ſwelling, from being at firſt ſoft and of a doughy feel, by degrees turns more firm; and the colour of the ſkin from being for ſome time very little altered, at laſt acquires an unnatural white, ſhining appearance. As the diſorder increaſes, the tumor by degrees becomes larger; and from being originally confined to the uſual boundaries of the ſcrotum, it at laſt ſpreads up the groin; and the penis being likewiſe affected, becomes ſo ſwelled and diſtorted, as to be productive of much inconvenience and diſtreſs: And although the ſcrotum is compoſed of parts which readily admit of extenſive dilatation, yet in ſome inſtances the ſwelling here becomes ſo enormous as to burſt the ſurrounding parts entirely.

The various appearances we have enumerated are ſo characteriſtic of the diſeaſe as to render it almoſt impoſſible to confound this ſpecies of ſwelling with any other tumor to which the ſcrotum is liable.

We have already obſerved, that inſtances now and then occur of the ſcrotal anaſarca being produced by a local cauſe, but by much the greateſt proportion of

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all ſuch caſes depend upon a general hydropic tendency; ſo that the cure of this kind of hydrocele muſt depend almoſt entirely on the removal of that habit of body which originally produced it.

The treatment of the general diſorder of the conſtitution falls to the province of the phyſician, ſo we ſhall not here enter into the conſideration of it; but the aſſiſtance of Surgery is frequently required for relieving that great diſtreſs which theſe tumors always produce when they arrive at any conſiderable degree of magnitude.

In ſuch circumſtances, the object of Surgery is, by drawing off the water from the tumor, to diminiſh the ſize of it as much as poſſible; which not only affords much immediate relief, but is a means of the diſtended parts recovering their tone more readily than they otherwiſe would do.

Different methods have been propoſed for evacuating the water, viz. by the introduction of a ſeton, by the trocar, by inciſions, and by punctures.

All theſe methods, that by the trocar excepted, ſerve very effectually to evacuate the diffuſed water; and therefore we are to adopt that mode which not only creates leaſt pain, but which is leaſt liable to be productive of troubleſome conſequences; and this unqueſtionably is the method by punctures.

The ſeton and long ſcarifications may evacuate the water ſomewhat more quickly than punctures; but in dropſical conſtitutions, ſuch as this ſpecies of hydrocele is commonly connected with, they almoſt conſtantly go wrong.

For the firſt twenty four hours or ſo, ſcarifications give the patient much ſatisfaction; the water is almoſt entirely evacuated, the tumor is of courſe greatly diminiſhed, and much relief is thereby obtained. About this time, however the ſcarified parts commonly begin to fret, their edges turn hard and inflamed,

flamed, and by degrees an eryſipelatous kind of redneſs ſpreads over the neighbouring parts.

That fretful uneaſineſs which was at firſt complained of, by degrees turns into what the patient terms a burning kind of pain, which frequently becomes ſo tormenting as to deſtroy reſt entirely; and it but too commonly happens, that all the applications employed for relief, have no manner of influence in preventing the acceſſion of gangrene, by which the patient is at laſt in general carried off.

I will not ſay that ſuch ſymptoms are always induced by ſcarifications, but I have in many inſtances obſerved them; and on the contrary, although punctures do now and then terminate in the ſame manner, yet they are by no means ſo ready to do ſo.*

As ſcarifications are ſo apt to produce miſchief here, there is much reaſon to ſuſpect that either the trocar or ſeton, which both give ſtill more irritation, would commonly prove more hurtful. They are now accordingly in this ſpecies of the hydrocele very generally laid aſide.

When ſcarifications are to be employed, the method of doing it is, with the ſhoulder of a lancet to make two or three inciſions on the moſt depending part of the ſcrotum, each of an inch in length, and extending no deeper than the cutis vera: And when punctures are to be depended on, they are likewiſe to be made of this depth with the point of a ſpear pointed lancet; and five or ſix on the moſt prominent part of the tumor will commonly prove ſufficient. This number will in general evacuate the water very quickly; but when they do not prove fully adequate to the effect propoſed, or when in the courſe of a day or two, theſe now made are found to heal, they may be renewed from time to time as often as is neceſſary.

Preſerving

* Vide Le Dran's operations, with Cheſelden's notes, p. 116; and Treatiſe on Hydrocele by Mr. Pott, p. 40.

Preſerving the parts as dry as poſſible, by a frequent renewal of dry ſoft linen cloths, in order to imbibe the moiſture, is here a very neceſſary piece of attention; the want of it, I am convinced, is the cauſe of much of the miſchief that frequently enſues from operations of this kind.

When either ſcarifications or punctures go wrong, by beginning to inflame and turn painful in the manner we have deſcribed; inſtead of the warm emollient poultices and fomentations uſually employed, a cold ſolution of ſaccharum ſaturni, applied upon ſoft linen, not only proves more effectual in putting a ſtop to the farther progreſs of the inflammation, but affords more immediate relief to the preſent diſtreſs. Aqua calcis employed in the ſame manner proves alſo a very uſeful application.

When, however, the diſorder proceeds to gain ground, by a real mortification coming on, we ſhould immediately have recourſe to bark and other remedies uſually employed in ſuch affections. But as we have elſewhere treated fully upon this ſubject, it is unneceſſary to enter into a more particular conſideration of it here.*

It may only be proper to obſerve, that although in general, when the ſcrotum in this diſeaſe happens to mortify, the greateſt danger is to be dreaded; yet now and then very unexpected cures are obtained, after all the teguments have been deſtroyed by mortification. A remarkable caſe of this kind occurred ſome years ago in the Royal Infirmary here: The whole ſcrotum ſeparated, and left the teſticles quite bare. During the time that the ſore remained open, all the water collected in other parts of the body was evacuated, and by the uſe of large quantities of bark and mild dreſſings to the ſore, the patient got well. In the courſe of the cure, the teſtis became enveloped with a kind of cellular ſubſtance, which ſerved as a very

* Vide Treatiſe on Ulcers, &c. Section IV. *On Mortification.*

very good means of protection. It must have been some production of this kind, I suppose which Hildanus speaks of as a regenerated scrotum.*

We have already observed, that although this species of hydrocele for the most part depends upon a general dropsical tendency, that some instances, however, occur, of a local cause producing a mere local dropsy of the scrotum. Thus it has been known to happen, from swellings in the groin and in the abdomen obstructing the passage of the refluent lymphatics. When this is the case, if the tumors producing such obstructions can be extirpated, no other means will afford such effectual relief; but when they are so deeply seated as to render any attempt for removing them improper, the practice we have already pointed out, of punctures in the most depending part of the tumor, must be employed with a view to palliate such symptoms as occur.

It sometimes happens in cases of suppression of urine, either from caruncles in the urethra, from stones impacted in it, or from collections of matter, that the urethra bursts, and the urine in this manner finding a passage into the scrotum, an anasarcous swelling of it is thus suddenly produced, which still continues to increase till the cause giving rise to it is removed.†

In order to prevent the formation of sinuses, which in such circumstances will otherwise be apt to occur, an incision should be made into the most depending part of the scrotum, and carried to such a depth as is sufficient for reaching the wound in the urethra. In this manner a free vent will not only be given to the urine already diffused, but the farther collection of it may very probably be prevented. If a stone impacted in the urethra is found to be the cause of this effusion, it ought to be cut out; if a collection of matter is discovered, the abscess should be opened; and if

* Observat. Chirurg. cent 5. obs. 76.
† The works of the late Dr. Alex. Monro, p. 569.

if the obſtruction is produced by caruncles in the urethra, bougies ſhould be employed for their removal.

The cauſe being thus removed, if the patient's habit of body is good and untainted with any veneral or other general affection, by dreſſing the ſore properly with ſoft eaſy applications, the opening into the urethra will probably be brought to heal, and a complete cure will be in this manner obtained. But when ſuch ailments are complicated with any general diſorder of the ſyſtem, particularly with old venereal complaints, it frequently happens, that neither mercury nor any other medicine has much influence in removing them.

Every practitioner muſt have met with inſtances of this kind. Both in the hoſpital and in private I have met with ſuch caſes, where, notwithſtanding all the means employed for relief, the paſſage from the urethra remained open, and continued to diſcharge conſiderable quantities of urine.

Inſtances of the ſcrotal anaſarca of a local nature, have alſo occurred, from the rupture of a hydrocele of the tunica vaginalis teſtis: When this ſpecies of hydrocele arrives at a great ſize, jumping from a height, or a violent blow or bruiſe of any kind, will readily burſt it; and the water not finding a paſſage outwardly, muſt neceſſarily diffuſe itſelf over the whole ſcrotum. Different inſtances of this kind have been met with; two of which are related by Douglaſs.* And the ſame kind of ſwelling has been produced by the water of a hydrocele of the vaginal coat being improperly drawn off by the operation of tapping. When the orifice in the ſkin is allowed to recede from the opening into the vaginal coat before the water is all diſcharged, the remainder of the collection is very apt to diffuſe itſelf through all the cellular ſubſtance of the ſcrotum.

In whichever of theſe ways the ſwelling is produced, the cure ought to conſiſt in laying the tumor ſufficiently

* Treatiſe on the Hydrocele, by John Douglaſs, p. 8.

ciently open, not only for evacuating the diffuſed water, but for effecting a radical cure of the hydrocele of the tunica vaginalis.

We have thus enumerated all the varieties of anaſarcous ſwellings to which the ſcrotum is liable, together with the modes of treatment adapted to each: For with reſpect to the hydrocele of the dartos, a diſeaſe particularly deſcribed by ancient writers, as that part of the ſcrotum is now known to be altogether cellular, ſo any water collected in it muſt tend to form that very diſeaſe we have now been deſcribing, an anaſarcous ſwelling of the whole ſcrotum.

We now proceed to the conſideration of that ſpecies of the diſorder, which, from its being ſeated within the cavity of the ſcrotum, we have termed the *encyſted hydrocele of the ſcrotum.* Of this there are two varieties, viz. the hydrocele of the tunica vaginalis teſtis; and that ſpecies of tumor formed by water collected in the ſac of a hernia.

SECTION III.

Of the HYDROCELE *of the* TUNICA VAGINALIS TESTIS.

WHEN treating of the anatomy of theſe parts, we remarked, that in a ſtate of health an aqueous ſecretion is always found in the tunica vaginalis; the principal uſe of which ſeems to be, to lubricate and keep the ſurface of the teſticle ſoft and eaſy.

In a healthy ſtate, this fluid is abſorbed by the lymphatics of the part; its place being as conſtantly ſupplied by a freſh ſecretion: But in diſeaſe, it frequently happens, either that the ſecretion of this fluid is morbidly increaſed, or that the powers of the abſorbing veſſels of the part are diminiſhed. The effect of either of theſe cauſes muſt be, to induce a preternatural collection of water in the cavity of the vaginal coat;

coat; and by a gradual accumulation of this fluid, the ſpecies of hydrocele which we are now conſidering will be at laſt produced. The ſymptoms and appearances of the diſorder are as follow.

A fulneſs is at firſt obſerved about the inferior part of one of the teſticles, which is at this time ſoft and compreſſible; but as the tumor increaſes in ſize, it alſo becomes more tenſe: No degree of preſſure can make the ſwelling diſappear either at this or any other period of the diſeaſe: The teguments at firſt preſerve their natural appearance, both as to colour and rugoſity; but as the water accumulates, the ſkin gradually becomes more tenſe, although ſeldom or never to ſuch a degree as to obliterate the rugæ of the ſcrotum entirely.

The ſhape of the tumor, which was at firſt nearly globular, becomes gradually more pyramidal, being larger below than above: In the firſt ſtages of the diſorder, the ſwelling does not extend farther than the uſual boundaries of the ſcrotum; but in proceſs of time, it advances by degrees up to the abdominal muſcles; ſo that although in the early period of the diſeaſe, if it be not combined with hernia, or with a hydrocele of the cord itſelf, the ſpermatic proceſs may be always diſtinctly felt; in its more advanced ſtate it cannot poſſibly be diſtinguiſhed.—The weight of the tumor being now very great, the ſkin of the neighbouring parts is dragged ſo much along with it as to cauſe the penis to ſhrink conſiderably, and ſometimes to diſappear almoſt entirely: And in this advanced ſtate of the diſeaſe, the teſticle, which uſually lies at the back part of the tumor, and which for ſome time after the commencement of the diſorder could be diſtinctly felt, cannot now be evidently diſcovered. On a minute examination, however, a hardneſs is always to be felt along that part of the ſcrotum where the teſtis is ſituated: And a fluc-

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tuation of a fluid may in general be diſtinguiſhed through the whole courſe of the diſeaſe.

It ſometimes happens, however, in that very tenſe ſtate of the tumor, which a long continuance of the diſeaſe uſually occaſions, that the fluid contained in it cannot be evidently diſtinguiſhed: Nor in this ſituation is the ordinary characteriſtic mark of hydrocele more to be depended on; I mean, the tranſparency of the tumor when expoſed to the light of a candle or of the ſun. In the early ſtages of the diſeaſe, when the contents of the tumor have not become diſcoloured, and when the vaginal coat has not yet acquired much thickneſs, the contained fluid, on being expoſed to this trial, always appears tranſparent; and when it does ſo, it always affords a corroborating proof of the exiſtence of water: Yet its abſence is by no means a proof of the contrary; for as the tranſparency of the tumor depends entirely on the nature of its contents, and on the thickneſs of its coverings, whatever tends to render the one leſs clear, and the other of a more firm texture, muſt in proportion to this effect invalidate the certainty of the teſt.

During the whole courſe of the diſorder the patient does not complain of pain in the tumor itſelf; but ſome uneaſineſs is commonly produced in the back, by the weight of the ſwelling on the ſpermatic cord: This, however, is generally either prevented altogether, or is at leaſt much alleviated, by the uſe of a proper ſuſpenſory bandage.

Theſe are the uſual appearances of a hydrocele when the diſeaſe is confined to one ſide of the ſcrotum, which is generally the caſe. But on ſome occaſions a double hydrocele is met with, in which both teſticles are affected in the ſame manner; and in which the tumor, inſtead of being confined to one ſide of the ſcrotum, occupies the whole of it equally.

As there are ſome diſorders with which this ſpecies of hydrocele is apt to be confounded, it is particularly neceſſary

neceſſary to attend to ſuch circumſtances as moſt readily characteriſe it. Theſe diſorders are, All the variety of ſcrotal herniæ; the anaſarcous hydrocele of the ſcrotum; the encyſted hydrocele of the ſpermatic cord; the ſarcocele, or ſcirrhous teſticle; and the hernia humoralis, or inflamed teſtis.

When treating of herniæ, we enumerated ſuch circumſtances as, when properly conſidered, will almoſt always ſerve to diſtinguiſh this ſpecies of hydrocele from every variety of theſe diſorders: To what was then ſaid, we muſt here therefore refer.*

It has on ſome occaſions, we are told, been confounded with the anaſarcous tumor of the ſcrotum; but the means of diſtinguiſhing the two diſeaſes are ſo evidently pointed out in the hiſtories we have given of their appearances, as to render it quite unneceſſary to enter farther into their conſideration. Indeed it muſt be groſs inattention only, which can ever render the anaſarcous ſpecies of hydrocele liable to any degree of doubt.

From the encyſted hydrocele of the ſpermatic cord, it may commonly be eaſily diſtinguiſhed, by the teſticle in the latter being plainly felt at the under part of the tumor; whereas in this diſeaſe, when the teſtis is perceptible, it is always at the back part of it: And in this ſpecies of hydrocele, the ſwelling begins in the under part of the ſcrotum, and proceeds upwards: Whereas in the encyſted hydrocele of the cord, it makes its firſt appearance above the epididymis, and by degrees falls down to the inferior parts of the ſcrotum. By this difference alone theſe two ſpecies of hydrocele may be always diſtinguiſhed from one another.

The circumſtances which moſt clearly diſtinguiſh this kind of tumor from a ſcirrhous teſticle are theſe: In the latter the ſwelling is hard and firm; it does not yield in any degree to preſſure; the ſurface of the

* See p. 313.

the tumor is rough and unequal; it is in general attended with a good deal of pain, and is always heavy in proportion to its ſize. Whereas in the hydrocele, the ſwelling commonly yields to preſſure; its ſurface is ſmooth; little or no pain takes place; and the tumor is light in proportion to its bulk.

Theſe differences will always ſerve as a ſufficient means of diſtinction between this ſpecies of hydrocele and a pure unmixed ſarcocele. But when a ſcirrhous teſticle is combined with an effuſion of water into the tunica vaginalis, forming what has very properly been termed a *hydro ſarcocele*, the means of diſtinction are not ſo obvious. In the incipient ſtate of ſuch effuſions, the difference between the two diſeaſes is ſufficiently apparent; but in the latter ſtages of it, the moſt attentive obſerver commonly finds it difficult, and ſometimes impoſſible, to mark the diſtinction. In ſuch doubtful caſes, however, by proceeding in the cautious manner to be afterwards pointed out, no detriment will occur to the patient from any uncertainty of this nature.

From the hernia humoralis this ſpecies of hydrocele is eaſily diſtinguiſhed. In the former, the tumor ſucceeds either immediately to ſome external bruiſe; or it is evidently the conſequence of a gonorrhœa, or of ſome other inflammatory affection of the urethra.* The ſkin is more or leſs affected with an inflammatory redneſs; it is attended with a conſiderable degree of pain, eſpecially on handling, and the ſwelling is hard and firm; ſo of courſe no fluctuation can be diſtinguiſhed in it, unleſs in its more advanced ſtate, when ſuppuration ſometimes takes place, and when the uſual ſymptoms of abſceſs, particularly the pointing of the

* The operation of lithotomy is frequently attended with an inflammation of one, and ſometimes of both, of the teſticles; probably from the inflammation induced by the operation in the neighbourhood of the caput gallinaginis, being communicated along the vas differens to the teſtes.

the tumor, and its being much diſcoloured, ſerve to diſtinguiſh it ſufficiently.

In forming a prognoſis of this diſeaſe, we muſt be directed almoſt entirely by the habit of body of the patient. In general, we are to conſider it as a local affection; and in that ſtate the moſt favourable expectations may be formed of the event; for, whatever may have been alleged by ſome writers as to the hazard of every operation for a radical cure of the diſorder, in a ſimple unmixed hydrocele, and in a ſound healthy conſtitution, it may at any time be adviſed with a very fair proſpect of ſucceſs.

In the radical cure of the hydrocele, in whatever way it is attempted, ſome pain will be occaſioned; the parts will inflame, and of courſe ſome degree of fever muſt be expected. In ſome inſtances, theſe ſymptoms have gone rather farther than was juſt neceſſary; but under the limitations I have already mentioned, of an unmixed ſtate of the diſorder in a conſtitution otherwiſe healthy, whenever the operation has been properly performed, I can ſafely aver, that of a very conſiderable number I have operated upon myſelf, as well as of many I have been connected with, I never knew one inſtance of any thing bad occurring.

But on the contrary, in conſtitutions otherwiſe diſeaſed; in old people; and in infirm habits of body; we are by no means to expect ſuch certain ſucceſs: Even in ſuch circumſtances, the operation very frequently ſucceeds; but it muſt be acknowledged that it now and then fails. The ſymptomatic fever is apt to run too high for the ſtrength of the patient; and the ſuppuration produced by a high degree of inflammation tends afterwards to deſtroy entirely the remains of a conſtitution already much impaired. This, however, ought not to be laid to the account of the operation, but to the real diſeaſed ſtate of the patient.

When, therefore, this diſorder occurs in a healthy conſtitution, I would conclude, from all the experience

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I have had in it, that little or no danger is to be dreaded from any neceſſary operation: And on the contrary, in a diſeaſed ſtate of body, that ſome riſk is always incurred by every operation that takes place; and the degree of riſk we may ſuppoſe will be always in proportion to the nature and extent of that diſeaſe with which the conſtitution is affected.

As long as a ſwelling of this nature keeps within moderate limits, patients in general rather ſubmit to the inconvenience produced by it, than undergo the pain of an operation; at leaſt this is commonly the caſe among people of better rank, who can more readily put up with any diſtreſs which it occaſions, than the poorer ſet of patients, whoſe daily labour is frequently impeded by large tumors in the ſcrotum. Among thoſe of the former claſs, inſtances occur of the diſorder having exiſted for a great length of time without being productive of much inconvenience: But even among theſe it commonly happens that they become anxious; fatigued with uncertainty; and are at laſt induced to ſubmit to the operation.—In all ſuch inſtances, when the conſtitution is otherwiſe ſound, this may be undertaken, as we have already remarked, with an almoſt certain proſpect of ſucceſs; but when the ſyſtem is materially diſeaſed, a patient had better ſubmit to any inconvenience produced by the diſorder, than undergo an operation for a radical cure: And this may be the more eaſily agreed to from the relief which people with tumors of this kind always experience from tapping, which is termed the Palliative Cure; and which when it is properly done, if the conſtitution is not greatly impaired indeed, may be always ſubmitted to without any dread of its proving hazardous.

Various methods are propoſed by authors for the treatment of this diſorder. All of them, however, may be reduced to two general heads; viz. ſuch as have in view only a temporary relief, and which, as

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we have just now observed, is termed the Palliative Cure; and such as are intended for effecting a Radical Cure, or a final removal of the disorder.

Whatever advantages may be experienced, from the use of internal medicines, in dropsical affections of the constitution, no practitioner, I believe, has so much confidence in remedies of this kind, as to expect much benefit from them in any partial hydropic collections of the encysted kind: We have daily proofs of their general failure in almost every affection of this nature; and in no species of dropsy do they prove more ineffectual than in the hydrocele.—We are told, indeed, of cures having been performed by different medicines, particularly by the use of strong drastic purgatives: I have known them employed, but never with advantage; and when pushed to any extent, they are sure to hurt the constitution.—As it is always necessary, however, to confine the patient to bed for some time after any operation that takes place, in order to prevent his being afterwards disturbed, it is proper to empty his bowels by a laxative immediately before the operation; but this is almost the only medicine that can be requisite. Internal medicines, therefore, being found ineffectual, as well as external applications, we are to seek for that relief from Surgery which experience shows it is capable of affording.

When the tumor in the scrotum has acquired such a size as to become inconvenient, if the patient either refuses to submit to the operation for the radical cure, or if his state of health renders that operation improper, in such circumstances, the palliative treatment, or a mere evacuation of the water by puncture, is the only means we can employ.

There are two methods proposed for drawing off the water in this manner, viz. by the puncture of a lancet, or with a trocar—It is alleged by some, that by the mere puncture of a lancet the water can neither be so completely or so properly drawn off as when the

the trocar is employed; for the orifice in the ſkin being apt to recede from the opening in the vaginal coat, the water is thereby either ſtopt altogether, or is apt to inſinuate itſelf into the ſurrounding parts. By others again it is ſaid, that the difficulty of introducing the trocar is ſuch as to render it hazardous from the contiguity of the teſticle; and inſtances are not wanting to ſhow, that even in the hands of expert ſurgeons the teſtis has been very materially injured by a trocar reaching it in this operation. Indeed, the ordinary form of this inſtrument, which is triangular, renders its introduction both difficult and unſafe; but the trocar of a flat form which I propoſed ſome years ago, enters with as much eaſe as a lancet.—In Plate X, different inſtruments of this kind are repreſented, of a proper ſize for this operation.—And as with a trocar of this kind an opening may be made into the tunica vaginalis with perfect ſafety, and the water with this inſtrument being much more freely evacuated than by a mere puncture with a lancet, which is apt to produce an effuſion into the cellular ſubſtance of the ſcrotum, the mode of effecting it by the lancet ought therefore to be laid aſide.

The inſtrument being fixed upon, the next point of importance is the part of the tumor moſt proper for the operation. Even in this ſimple operation, an acquaintance with the anatomy of the parts will appear to be very neceſſary. We have already ſhown, that the teſtis does not hang altogether looſe in the vaginal coat; but on the contrary, that its poſterior part is firmly connected to the body of the teſticle; ſo of conſequence at this part there is no water to be met with between the ſcrotum and teſtis; and accordingly it would be highly improper to attempt an opening at this place: For if through ignorance the trocar ſhould be inſerted here, one inſtance of which I have ſeen, the inſtrument would for certain pierce the body

of

Plate X.

Fig. 2

Fig. 3.

Fig. 1

Fig. 4.

of the teſticle, and would not, after all, evacuate the water.

The moſt proper part for introducing the inſtrument is the moſt anterior point of the under part of the tumor. The patient being ſeated on a chair, with the tumor hanging over the edge of it, the operator with his left hand ſhould graſp the tumor on its back part, ſo as to puſh the contained fluid as much as poſſible into the anterior and under part of the ſwelling. Having done ſo, he then makes an opening through the ſkin and cellular ſubſtance, of about half an inch in length, with the ſhoulder of a common lancet, on that point where the trocar is to enter. This gives very little pain to the patient; it is done in the ſpace of a ſecond or two, and it enſures an eaſy paſſage to the point of the inſtrument; a circumſtance which diveſts this operation of all kind of hazard.

The operator now takes the trocar in his right hand, and having fixed the head of the inſtrument in the palm of the hand, he places the fore finger along the courſe of it, leaving juſt as much of the point of the inſtrument uncovered as he thinks ought to penetrate the tunica vaginalis, and this being introduced in a gradual eaſy manner, the ſtilette is to be withdrawn immediately on the end of the canula having entered the cyſt. The water will now run off; and if the tumor be not of a great ſize, it may be all evacuated at once: But when the ſwelling is large, as the ſudden diſcharge of the fluid, by taking away too quickly the ſupport which it afforded to the veſſels of the teſtes and vaginal coat, might endanger the rupture of ſome of them, it is better every now and then to ſtop the flow of it for a few ſeconds; and when the whole is thus evacuated, and the canula withdrawn, a piece of adheſive plaſter ſhould be immediately applied to the orifice, and a compreſs of ſoft linen being laid over

over the ſcrotum, the whole ſhould be firmly ſupported by a proper application of the T bandage.*

The patient being in this ſtate laid in bed, it commonly happens, that in a few hours all manner of uneaſineſs is gone, and he goes about his ordinary buſineſs without farther interruption: Now and then, however, the ſore produced by the trocar feſters; and the inflammation thus produced, in ſome inſtances, has been known to terminate in a radical cure of the diſorder. Such occurrences, however, are rare, and are by no means to be depended on.

This operation, when done with attention, is eaſily performed, and is ſeldom productive of any miſchief; but when not performed with caution, and eſpecially when the patient is allowed to go about immediately after the water is evacuated, it ſometimes terminates in very troubleſome ſymptoms. Even when done with every poſſible attention, if the patient's habit of body is bad, it ſometimes goes wrong. Of this every practitioner may have ſeen ſome inſtances more or leſs remarkable: And two caſes are related by Mr. Pott; one of which terminated fatally; and in the other a mortification enſued, which in the ſpace of a few days deſtroyed not only a good deal of the ſcrotum, but even a conſiderable portion of the tunica vaginalis.† Both of theſe indeed occured in very unhealthy conſtitutions; but it is proper to have it known, that this operation may in ſuch habits of body be productive of theſe conſequences. In ſound healthy people, it ſeldom or never ends in any thing bad; but the event of theſe caſes of Mr. Pott and others, ought to convince us that it ſhould not be attempted where the ſyſtem is evidently much diſeaſed.

Drawing the water off in this manner in order to relieve the patient from the bulk it produced, was the firſt

* Some very judicious remarks on the importance of a due degree of compreſſion in ſuch caſes may be met with in Dr. Monro's obſervations on this ſubject, *loco citato*.

† Caſes xxi and xxii, Treatiſe on the Hydrocele.

first idea that occurred to practitioners in the treatment of the Hydrocele; but this being found ineffectual for the complete removal of the disease, various other methods were afterwards introduced. The actual cautery and the ligature were both proposed as means of preventing farther descents of water from the abdomen, which in former times was considered as the origin of this disorder. Celsus orders a cyst of a hydrocele to be cut away, and many of his followers do the same. Tents, both solid and hollow, were afterwards employed; as was likewise the use of the seton, which we find recommended by Fabricius ab Aquapendente, and other writers even of a more early period. The use of various applications of the caustic kind has at different times been in vogue: Injecting wine, diluted ardent spirits, and other irritating liquids, into an opening in the vaginal coat, has been proposed as a means of inducing a degree of inflammation sufficient for effecting a radical cure; and a simple incision of the cyst containing the water has been practised for the same purpose.

These, I think, comprehend all the variety of means which at different periods have been employed for the cure of the hydrocele. Ancient practitioners seem to have been acquainted with all of them; but having very inaccurate ideas of the anatomy of the parts concerned, they could not have any fixed or clear opinion of the manner in which any of their remedies operated in effecting a cure. In consequence of this they were applied very much at random; and no method proving at all times successful, the ignorance they laboured under in the theory of the disorder rendered changes of remedies very frequent in the treatment of it.

One material advantage obtained by the moderns in this point is, that by knowing the water to be contained in a particular cyst with which no part of the body communicates, they are thereby left at liberty

to

to apply their remedies without any dread of injuring parts which were formerly ſuppoſed to be connected with the teſticle; and by finding that the water collected in this diſeaſe, is in many reſpects in a ſimilar ſituation to the contents of other tumors, with the means of curing which they are well acquainted, they have ventured from analogy to transfer the method of treatment found to ſucceed in theſe diſorders, to this ſpecies of the hydrocele.

Matter collected in a particular cavity or cyſt, we ſuppoſe to be in circumſtances very ſimilar to water collected in the tunica vaginalis teſtis. In both ſituations, the contents of the tumor are ſecluded from acceſs to the external air; and neither of them have any communication with any other part of the body. And although the bag containing the matter of an encyſted tumor is in ſome meaſure a new formation, yet in many inſtances it is found to be equally firm and elaſtic with the tunica vaginalis teſtis.

In the treatment of encyſted tumors, practitioners are now agreed, that, beſides evacuating the matter, means muſt be employed for deſtroying the cavity which contained it, otherwiſe a return of the diſorder may in general be expected. To accompliſh this, different methods have been propoſed; ſome with a view to deſtroy entirely the cyſt which contained the matter; and others, as it is ſaid, to fill up the cavity of the cyſt with a formation of new parts.

But we now know, that unleſs the coats of a cyſt are much extended, and greatly thickened indeed, that there is no reaſon whatever for removing any part of it. It is alſo known, that to fill up the cavities of tumors with a creation of new parts, is a mere imaginary matter, being what neither art or nature ever effects to any extent: And we likewiſe know, that the cavity of almoſt every tumor may be more effectually deſtroyed by producing an adheſion of its ſides than by any other means.

Parts

Parts of the human body in a ſtate of inflammation very readily adhere to one another. Indeed ſo eaſily do they do ſo that ſome art is required to prevent the adheſion of contiguous inflamed parts. By attempting the cure of abſceſſes and of encyſted tumors, on principles analogous to this, the ſame phenomena were found to happen; for, after diſcharging their contents, it has been found, that cures are commonly obtained with more eaſe and certainty by inducing a ſufficient degree of inflammation on their internal ſurfaces, than by any other means. And in like manner it is now known, that the hydrocele of the tunica vaginalis, may be treated upon the ſame principles, and with the ſame general effects.

This is the moſt ſimple idea that can be given, of the preſent views of practitioners in the treatment of this diſorder; and I hope it will ſerve to render their ideas reſpecting it ſufficiently clear.

The intention, then, of every means now in uſe for the radical cure of this ſpecies of the hydrocele, is, to induce ſuch a degree of inflammation on the parts, as may tend to obliterate entirely the cavity of the tunica vaginalis, by making it adhere firmly to the tunica albuginea or ſurface of the teſticle.

Some individuals, indeed, ſtill proceed upon the ſuppoſition of a total deſtruction of the ſac being neceſſary for a complete cure. But the extenſive experience of many of the beſt employed ſurgeons makes it appear very clear that this is never neceſſary. When the ſac has become very thick, and has been diſtended to ſuch a degree as entirely to have loſt its tone, removing a ſmall part of it ſometimes proves uſeful, by allowing the ſcrotum to contract more readily; but in no other point of view is it in any degree requiſite.

We know well, that in this, as in every ſpecies of encyſted tumor, a cure may be, and frequently is, obtained, by removing the ſac entirely; for, the contiguous parts from whence the ſacs have been

been diſſected, adhere very readily together, ſo as to deſtroy effectually the cavities in which the matter was contained.* But we alſo know that this is never neceſſary, as the ſame end may be always obtained by much more gentle means.

We ſhall now proceed to the particular conſideration of the ſeveral means at preſent employed by different practitioners for effecting a cure, and ſhall treat with moſt minuteneſs thoſe which are now in moſt general uſe. Theſe are, excision of the tunica vaginalis; the application of cauſtic; the uſe of a ſeton; and a ſimple inciſion of the ſac.

By Mr. Douglas it is recommended † to deſtroy the vaginal coat entirely; and his method of doing it, is, firſt to diſſect out an oval piece of the ſcrotum, which he conſiders as always neceſſary; and having then laid the vaginal coat open, to cut it away by different ſnips of a pair of ſciſſors. But if there is any practitioner who ſtill continues to prefer this exciſion of the ſac, he will find that it may be more eaſily diſſected away by the ſcalpel than with ſciſſors, and it is rarely neceſſary to remove any portion of the ſcrotum.

The method of cure with cauſtic is commonly deſired to be conducted in the following manner: The ſcrotum being ſhaved, a piece of common paſte cauſtic properly ſecured with adheſive plaſter is to be applied, of about the breadth of a finger, the whole length of the tumor; and if, on removing the cauſtic, it has not penetrated the tunica vaginalis, this is ordered to be done with a ſcalpel, ſo as to evacuate the contents, lay bare the teſticle, and admit of proper dreſſings.‡

But

* Mr. Elſe aſſerts, that in the method he recommends of curing this ſpecies of Hydrocele by cauſtic, the tunica vaginalis ſloughs entirely off.

† Loco citato.

‡ Douglas on the Hydrocele, pag. 3. Pott, *loc. cit.* pag. 155.

But Mr. Elſe, one of the lateſt writers in favour of the method by cauſtic, ſays, that there is no neceſſity for ſuch an extenſive application of cauſtic as has been recommended by authors: That an eſchar of the ſize of a ſhilling anſwers the purpoſe ſufficiently: That this may be always fully obtained by the application of cauſtic paſte of the ſize of a ſixpence; which he directs to be laid upon the anteriour and under point of the ſcrotum, and to be properly ſecured by adheſive plaſter in order to prevent it from ſpreading.†

The cauſtic commonly produces all its effects in the ſpace of five or ſix hours, and may then be removed. At this time digeſtives, or an emollient poultice, muſt be applied over the ſcrotum; and the whole properly ſuſpended with a bandage.

Inflammation, we are told, is ſoon induced over the whole tunica vaginalis; and the febrile ſymptoms which ſucceed, are directed to be kept moderate by bloodletting, injections, &c. In a few days the eſchar of the ſcrotum ſeparates and comes away; and in a gradual manner, in the courſe of four, five, or ſix weeks, the whole tunica vaginalis comes off, when the wound immediately cicatrizes, and a complete cure is obtained.

When the ſeton is to be uſed, the following is the method of applying it, as is recommended by Mr. Pott, who has wrote a very ingenious treatiſe on this ſubject: He uſes a trocar; a ſilver canula, five inches in length, and of ſuch a diameter as to paſs eaſily through the canula of the trocar; and a probe, ſix inches and a half long, having at one end a fine ſteel trocar point, and at the other an eye which carries a cord of coarſe white ſewing ſilk, of ſuch a thickneſs as will paſs eaſily through the long canula. With the trocar, the inferior and anterior point of the tumor is to be pierced; and as ſoon as the perforator is with-

drawn

† *Vid.* An Eſſay on the cure of the Hydrocele of the tunica vaginalis teſtis, 2d edition, p. 33.

drawn, and the water diſcharged, the ſeton canula is paſſed through that of the trocar, till it reaches the upper part of the tunica vaginalis, and can be felt in the very ſuperior part of the ſcrotum. This being done, the probe armed with its ſeton is to be conveyed through the latter canula, the vaginal coat and teguments to be pierced by its point, and the ſeton to be drawn through the canula till a ſufficient quantity is brought out at the upper orifice, when both the canulas are to be withdrawn, and the operation is finiſhed.

About the end of the third day, the parts begin to inflame; when fomentations, poultices, a ſuſpenſory bandage, a temperate regimen, and a lax belly, are ordered, to keep the ſymptoms moderate: As ſoon as the parts become eaſy by the inflammation leſſening, which is generally about the tenth or twelfth day, the ſeton is begun to be diminiſhed, when ſix or eight threads are withdrawn at every dreſſing; the dreſſings conſiſting of nothing more than a ſuperficial pledgit upon each orifice, and a diſcutient cerate, ſuch as the ſeratum ſaturninum, to cover the ſcrotum.

In uſing the ſeton, I ſhould wiſh to follow the method here deſcribed, in every other point except in the mode of introducing it; an eaſier method of doing it being now diſcovered. In a former publication, I have deſcribed the manner of opening abſceſſes by a ſeton; and the directions then given, prove equally applicable here. Let an opening be made, either with a ſcalpel or a lancet, in the ſuperior part of the tumor, large enough to admit with eaſe a cord of white ſewing ſilk of a proper ſize. The curved director with an eye at one end, * in which the cord is inſerted, is to be introduced at this opening; and its farther extremity being carried down to the moſt depending part of the tumor, an opening is there to be made of about half an inch or ſo in length, by cutting

* Delineated in the Treatiſe on the Theory and Management of Ulcers, &c.

ting upon the end of the director with a scalpel. The director being now drawn down till a sufficient quantity of silk is left hanging out below, the operation is then finished. In every other respect the management of the seton ought to be the same with the method we have described from Mr. Pott.

By making the first opening in the superior part of the tumor, the instrument conducting the seton is more easily introduced to the farther extremity of the swelling, than when the first opening is made below; for in this case, the tumor remains distended to the last: Whereas, when opened below, the water rushes out immediately; and the vaginal coat collapses so much about the testicle, that I have seen a good deal of difficulty in getting the instrument insinuated between them, by which I have been sensible of the testis being considerably injured.

Before entering farther into the consideration of this method of cure by the seton, we shall proceed to describe the operation for a radical cure by incision.

The patient being placed upon a table of a convenient height, and being properly secured by two assistants, with the scrotum lying nearly upon the edge of the table, the operator with one hand should grasp the tumor so as to hold it firm and make it somewhat tense on its anterior part; and with a common round edged scalpel in the other, he should now divide the external teguments by one continued incision from the superior extremity of the tumor all along its anterior surface down to the most depending point of the swelling.

By this means, as the divided scrotum retracts a little, the tunica vaginalis is laid perfectly bare, for the breadth of about half an inch from one extremity to the other. An opening is now to be made with a lancet into the vaginal coat, just at its upper extremity where the first incision commenced. This opening should be of such a size as to receive the finger of the

operator; which being inſerted, the probe pointed biſtoury is to be conducted upon it, and by means of it the ſac is to be divided to the very bottom, all along the courſe of the firſt inciſion. By the previous diviſion of the ſkin with the ſcalpel inſtead of the biſtoury, the operation is done with much more accuracy, and with leſs pain; for the ſcalpel from its convexity admits of a much finer edge than an inſtrument of any other form is capable of receiving, and hence it cuts with more eaſe.

By making the firſt opening in the upper end of the ſac, much trouble and inconvenience is prevented, which making the firſt orifice below is ſure to occaſion: For, as we have before remarked, when the tumor is firſt opened below, the water is inſtantly evacuated; and as this produces an immediate collapſe of the tunica vaginalis, the paſſage through it is not afterwards eaſily diſcovered. Whereas, by making the firſt opening above, as the water is thereby evacuated gradually as the exciſion is extended downwards, the vaginal coat continues diſtended to the bottom till the inciſion is completely finiſhed.

We have not thought it neceſſary to ſay any thing here of the probe pointed ſciſſors, an inſtrument which ſome time ago was very generally employed in this operation: For wherever the knife can with propriety be uſed, no ſurgeon of theſe times will heſitate in preferring it.

We have directed the inciſion into the vaginal coat to be carried from one extremity of the tumor to the other. Many ſurgeons, with a view to ſave ſome pain to the patient, adviſe the inciſion both of the ſcrotum and tunica vaginalis to be only two thirds of the length of the tumor. But the difference of pain thus produced is very little; being indeed nothing when compared with the uncertainty of a radical cure not being obtained by it. When the inciſion is carried the whole length of the tumor it is rarely found

to

to fail; and I have known ſundry inſtances of theſe partial openings being followed with a return of the diſeaſe.*

The inciſion being completed in the manner we have directed, the teſticle covered with its tunica albuginea comes into view. Sometimes the teſtis protrudes from the wound altogether; in which caſe it ſhould be replaced with great caution, and ought by all means to be covered as quickly as poſſible from the external air; and provided none of the tunica vaginalis is to be removed, this may be always done immediately by finiſhing the dreſſing directly on the ſac being opened.

When the ſac is not much thickened, there is no neceſſity for removing any part of it; but when it is diſcovered to be otherwiſe; to be thick and very hard; the removal of a portion of it on each ſide of the inciſion, makes the cure of the remaining ſore more eaſy and expeditious. As in this hardened ſtate, the ſac generally ſeparates with great eaſe from the ſurrounding teguments, any quantity of it may be eaſily taken away with the ſcalpel without the leaſt danger of wounding the ſcrotum. Some writers indeed adviſe part of the ſcrotum itſelf to be cut away on every occaſion;† but even in the moſt enlarged caſe of hydrocele I ever met with, no neceſſity ever appeared for removing any part of it.

On examining the teſticle after the diviſion of the vaginal coat, it is generally found to be of a ſoft texture, and of a more pale complexion than in a healthy ſtate: On ſome occaſions it is conſiderably enlarged; and on others, I have ſeen it reduced to a very ſmall ſize, conſiſting of the tunica albuginea almoſt quite empty. As the cure of the ſore, however, advances, the teſticle in a gradual manner commonly regains its uſual bulk; of this I have ſeen different inſtances, and a very

* Mr. Pott is clearly of this opinion. *Loc. cit.* p. 163.
† *Vide* Douglas on the Hydrocele, 136.

a very remarkable case of the same kind is recorded by Douglas.*

We have hitherto supposed that the disorder is confined to one side of the scrotum; but now and then, as we have elsewhere remarked, a double hydrocele is met with. The ordinary practice in such a case, is, to do the operation twice in all its parts, both in the scrotum and tunica vaginalis; to lay each collection open from top to bottom, by a double incision. Sometimes both operations are done at the same time; but in general practitioners are afraid of too much inflammation being thus induced, so that one is commonly allowed to heal before the other is attempted. In this manner the patient is exposed to delay, uncertainty, and to the hazard of two complete operations.

It may be done, however, in a much easier manner, with much less pain, and in less time, than in the ordinary method.

After finishing the operation on one side, by making an opening into the vaginal coat of the opposite testicle at its upper extremity through the *septum scroti*, and continuing the incision down to the bottom of the tumor, the cyst is thus equally well laid open, the water is as completely evacuated, and the patient is liable to as little hazard of a return of the disorder, as if the operation had been done in the usual manner.

From the account we gave of the anatomy of the scrotum, no danger, it is evident, can occur from any division of the septum, which we have shown to be entirely composed of cellular substance; and in fact I have twice had an opportunity of performing this operation in the manner here directed upon a double hydrocele, and in both instances with most complete success.

Whether the hydrocele be double or confined to one testicle, as soon as the water is all evacuated, and any part of the vaginal coat removed that may be necessary,

* *Loc. cit.* p. 194, Case II.

eſſary, the wound ought then to be dreſſed; and on this it may obſerved, much of the ſucceſs to be expected from the operation depends.

If the vaginal coat be juſt wrapped about the teſticle without the interpoſition of any kind of dreſſing, partial adheſions are apt to occur, before a degree of inflammation is produced ſufficient for rendering the cure complete. By this means cavities are left, which either fill with pus during the progreſs of the cure, or afterwards afford an opportunity for collections of water, and thus occaſion a return of the diſorder; different inſtances of which I have met with.

And again, a deſire for ſtuffing the cavity of the ſore too much with dreſſings has alſo been a frequent cauſe of miſchief. By their rubbing or preſſing too much upon the ſurface of the tunica albuginea, a part which nature never intended to be much expoſed, ſuch a degree of inflammation is ſometimes induced as to be productive of much pain, inflammation, and fever: But it is commonly the fault of the operator when this is the caſe; for in a ſound healthy conſtitution, it ſeldom happens that either of the occurrences we have mentioned take place when the dreſſings are properly managed.

The method I have uniformly found to ſucceed, is this: The teſticle, if it has puſhed forwards, as it ſometimes does, out of the ſcrotum entirely, being cautiouſly replaced, a piece of ſoft lint ſhould be inſerted between it and the divided vaginal coat, firſt on one ſide of the divided ſac, and then on the other, reaching from the ſuperior part of the tumor to the moſt depending point of it. One end of each piece of lint ought to be left out of the ſore, to fold over the edges of the wound; and the other ought to be gently puſhed in between the teſtis and the vaginal coat, about half way between the external inciſion and the bottom of the ſac: If leſs is inſerted, it does not with certainty anſwer the purpoſe; and I have commonly

monly found that a ſingle ply of fine lint may be introduced this length without any difficulty, and experience ſhows it to be ſufficient. A compreſs of ſoft linen being now applied over the tumor, the whole ſhould be properly ſuſpended with a bandage; and for this purpoſe, either the T bandage, or the common ſuſpenſory bag, may be employed. The patient is now to be carried to bed; an anodyne ſhould be preſcribed; and he ought to be enjoined to remain as much in the ſame poſture as poſſible, for much motion in this ſtate of the ſore certainly does miſchief.

The intention of this operation being to induce a moderate degree of inflammation in the parts chiefly affected, viz. the tunica vaginalis and tunica albuginea, if the pain, inflammation, and ſwelling, which in ſome degree always ſucceed to the operation, do not run to a great height, nothing is to be done for the firſt two or three days after the operation: But, when theſe ſymptoms become violent, and eſpecially when any conſiderable degree of fever is induced, it muſt then be the buſineſs of art to prevent their going too far. The remedies to be uſed for this purpoſe, are, bloodletting, according to the ſtrength of the patient; gentle laxatives, ſo as to preſerve an eaſy ſtate of the bowels; a low cooling diet; and warm emollient poultices and fomentations to the part, in order to forward a plentiful ſuppuration, which commonly tends to moderate every bad ſymptom more effectually than any other remedy.

By theſe means the inflammation may in almoſt every inſtance be kept within proper bounds: From all the experience, indeed, which I have had in this diſorder, I might ſay that it may be done in every inſtance; for I never yet ſaw any thing to the contrary, where the operation was properly performed, in a ſound healthy conſtitution.

When, again, the pain, inflammation, and tumefaction of the parts, do not come to a great height, the

cataplaſms

cataplasms and fomentations need never be employed before the fourth day: About this time, by fomenting the parts, and applying a large emollient poultice over the whole, the external dressings are commonly easily removed about the fifth or sixth day. At this time, on taking them away, the edges of the sore are observed to be hard, and considerably swelled; and the matter discharged is thin and discoloured: If the lint inserted between the testis and the vaginal coat can be easily taken out, it may at this time be removed; but in general, it does not come away with freedom till the third or fourth dressing, when the swelling of the parts is somewhat diminished. The sore ought to be dressed once every day or two, according to the quantity of matter produced; and the poultices should be continued till a plentiful suppuration is established.

In twelve or fourteen days from the operation, the suppuration is in general very freely formed; and the swelling of the parts is now so much reduced as to give the whole a fine healing appearance: The only dressing necessary in this state of the sore, is a little soft lint, covered with a pledgit of any emollient ointment. The swelling of the scrotum now gradually subsides; and the sore continuing to lessen daily, a complete cure is commonly obtained in the space of four, five, or six weeks, according to the size of the wound and other circumstances.

Having thus given an account of the manner of performing every operation at present in use for the radical cure of the hydrocele, we shall now make a few observations on the comparative advantages of the three last, viz. the caustic, seton, and the simple incision; these being almost the only means now practised for the removal of this disorder. From the testimony of many respectable authors concerning the efficacy of each of these, there is no reason to doubt, but that collections of this kind may in general be cured

cured by any of them. That the cauſtic, when properly managed, will ſeldom fail of producing a cure, we have every reaſon to believe; and the ſame may be ſafely aſſerted both of the ſeton and the ſimple inciſion. But, it commonly happens, that a practitioner, from being prejudiced in favour of a particular method, continues to practiſe that mode and no other; and finding it in general ſucceed, he by degrees comes to perſuade himſelf, that other methods of cure with which he has not had ſuch opportunities of becoming acquainted, are liable to objections, which thoſe who have practiſed them do not find to be the caſe.

I attended the hoſpitals in London about the time that Mr. Pott's publication on the Seton, and Mr. Elſe's Treatiſe on the Cure of the Hydrocele by Cauſtic, were publiſhed; when of courſe the various means of curing the diſorder were frequently the ſubject of medical converſation. I was thereby induced to pay particular attention to the ſubject; and having the advantage of ſeeing the practice of different hoſpitals, and not being particularly biaſſed in favour of any one method, I was thus furniſhed with an excellent opportunity of forming an opinion: And the reſult of all the obſervation I was either at that time able to make, or ſince that period, both in the hoſpital here, and in private practice, is, That although all the three modes of operating, by cauſtic, the ſeton, and ſimple inciſion, are perhaps equally capable of producing a radical cure; yet that of the three, the latter, viz. the ſimple inciſion, is liable to fewer objections, and effects a cure both with leſs trouble to the operator, and with leſs riſk to the patient: And of the other two, the treatment by cauſtic appears to me to be the moſt eligible.

I have ſeen all the three methods produce troubleſome ſymptoms, ſuch as great pain and tenſion of the abdomen, inflammation, and fever; but from much obſervation,

ſervation, I can without heſitation ſay, that the ſeton is more frequently productive of theſe conſequences than either of the others: And we need not wonder at this being the caſe; for the cord which is here introduced, lying in cloſe contact with the body of the teſtis, muſt neceſſarily occaſion a conſiderable and continued irritation, as long as it remains applied to it.

The ſeton is likewiſe attended with other inconveniences, to which neither of the others, when properly managed, are liable. When the inflammation which ſucceeds to the introduction of the cord runs very high, as it frequently does, it commonly terminates in ſuch a plentiful ſuppuration, that the matter produced by it cannot be readily diſcharged at the opening made for the ſeton: In conſequence of this, it inſinuates itſelf into the neighbouring parts; and different abſceſſes are accordingly formed, which muſt all be diſcharged by as many openings. Even when the operation has been done with much nicety and attention, I have ſeen it terminate in this manner.

Another objection to this operation, which I think of importance, is this: It does not admit of a free examination, either of the ſtate of the teſticle, or of the fluid contained in the ſac. I know, that in a ſimple uncomplicated hydrocele, there is no reaſon whatever for examining the teſticle; nor would we think of removing it either on account of a mere enlargement or diminution of its ſize, provided it be not otherwiſe diſeaſed. But we know well that caſes do ſometimes occur, which elude the utmoſt ſkill and penetration of the ſurgeon; no diagnoſtic ſymptoms with which we are yet acquainted being ſufficient to direct us with abſolute certainty.

The moſt experienced practitioner muſt be ſenſible, that at times he has been miſtaken in his opinion reſpecting the nature of ſuch tumors; a real ſarcocele, or ſcirrhous teſticle, attended with ſome effuſion of a fluid, being now and then miſtaken for a pure unmix-

ed hydrocele; and, *vice verſa*, a ſimple uncomplicated caſe of hydrocele has been frequently miſtaken for, and treated as, a ſcirrhous teſticle. Such occurrences every practitioner muſt have met with: And among other writers who confeſs their having been deceived in ſuch caſes, a very candid acknowledgment of this kind is made by Mr. Pott;* and Mr. Elſe takes notice of a ſimilar occurrence in which he was concerned.†

I have myſelf been concerned in different caſes, where the moſt experienced ſurgeons were at a loſs to determine the real nature of the diſorder; that is, whether the ſwelling in the ſcrotum was a ſimple hydrocele of the vaginal coat, or an effuſion of a fluid into that bag produced by a ſcirrhous teſticle. In all ſuch caſes where any doubt occurs, the ſurgeon ought to proceed as if the tumor was a real hydrocele. If, on laying open the ſwelling, the teſticle ſhould be found diſeaſed, that is, if it ſhould be in ſuch a ſtate as to require extirpation, it ought to be removed immediately; and on the contrary, if it ſhould appear to be perfectly ſound, the caſe ſhould undoubtedly be treated altogether as a ſimple hydrocele.

In ſeveral inſtances of this kind, where, by different practitioners, a mere collection of water was expected without any other affection, the teſticle has been found to be ſo much diſeaſed with a real ſarcocele, as to render extirpation highly proper. Now, if in ſuch circumſtances a cure had been attempted by the ſeton, the teſticle would have been allowed to remain expoſed to the irritation produced by the cord, which

* Treatiſe on the Hydrocele, p. 288. In this caſe, which from every circumſtance had been conſidered as a Sarcocele, the teſtis, after being removed, was found to be perfectly ſound; the diſeaſe being a *real Hydrocele* of the tunica vaginalis.

There being even a *poſſibility* only of ſuch an occurrence with ſuch an attentive obſerver as Mr. Pott, ought to ſerve as a moſt convincing argument with practitioners in general, of the neceſſity of proceeding with the utmoſt caution in all ſuch caſes where there is the leaſt cauſe for doubt.

† *Loc. cit.* p. 4.

which in all probability would have induced very troublesome and even alarming symptoms; for we know that every symptom of a scirrhous or cancerous tumor is uniformly rendered worse by irritation.

It has been alleged, that the real state of the testis may be always known, by drawing the water off from the tunica vaginalis by a trocar; and this has accordingly been recommended as a previous step to the introduction of the seton, with a view to ascertain the situation of the testicle. But it often happens, even after all the water is drawn off, that the thickness produced by the vaginal coat and scrotum, collapsing in large folds about the testis, precludes effectually every accurate examination of this kind.

We observed above too, that when the seton is used, the contents of the vaginal coat cannot be properly ascertained. It frequently happens, that the water of a hydrocele is contained in a number of hydatids; a circumstance which cannot be discovered previous to the opening of the tumor: And as it will be readily admitted that the method of cure by seton is ill suited for evacuating hydatids, this of itself is a very material objection to the practice. So that, upon the whole, although the seton in every other respect should be equally eligible with the simple incision, which for the reasons formerly given I think it is not, yet the two last objections we have adduced against it are sufficient reasons for setting it entirely aside.

With respect to the mode of treatment by caustic, I have only to observe, in addition to what was already said upon this subject, that where patients are naturally timid, and do not incline to submit to the operation by the knife, this will in general be preferable.

But the treatment by caustic is liable to one very material objection, which never attends the cure by incision, viz. that of being productive of sinuses, and collections of matter, in the scrotum and cellular sub-

stance

ſtance connecting that bag to the tunica vaginalis. One inſtance of this I have ſeen, where it was neceſſary to evacuate different collections of matter by different openings; and a remarkable caſe of the ſame kind is related by Douglas, where an extenſive inciſion was neceſſary for removing the collections which occurred.* For this reaſon, therefore, and as the mode by inciſion brings the ſtate of the teſticle more evidently into view; and eſpecially as, from all the experience I have had of the two different methods of cure, that by inciſion ſeems in general to be productive of the leaſt troubleſome ſymptoms, I am clear that it ought to be preferred.

In different publications, we read of many dreadful ſymptoms induced by this operation for the hydrocele; but the ſame objections have been adduced againſt every mode of operating hitherto propoſed, and the ſame will ſtill be continued by ſuch as judge from partial information. In old, infirm, or diſeaſed conſtitutions, this and every other mode of operating will on ſome occaſions be productive of troubleſome and perhaps fatal conſequences: On the contrary, all the three methods of cure of which we have been treating, viz. thoſe by cauſtic, the ſeton, and ſimple inciſion, will in general be found to anſwer the purpoſe very effectually, of producing a radical cure of the diſorder. What I have been here endeavouring to ſhow, and what the importance of the ſubject makes me again repeat, is, that this end will commonly be obtained with more eaſe both to the operator and patient by the ſimple inciſion than by any other means.

In a matter of this kind no perſon ought to form an opinion haſtily. Nothing but a variety of opportunities of putting the different operations in practice, can enable any practitioner to judge with propriety of the merits of each. In the writings of the late celebrated

* *Loc. cit.* p. 105.

brated Mr. Sharpe, we have a very remarkable inſtance of this. In his treatiſe on the Operations of Surgery,* he ſpeaks of the treatment of the hydrocele by inciſion as a very dangerous operation, and thinks that it will probably be diſcarded altogether.

At that time, it is evident, Mr. Sharpe's experience in this diſorder had not been ſufficient for warranting ſuch a deciſive opinion. It proved to be very contrary to the direct experience of ſome of our beſt ſurgeons; and Mr. Sharpe himſelf ſeems afterwards to be convinced that his firſt ideas reſpecting this operation had been very ill founded.†

I will not poſitively ſay, that the experience of another practitioner will not lead him to make a different concluſion reſpecting the ſucceſs of theſe three modes of operating. Conſequences which I have not met with, may follow each of theſe methods. My opinion is chiefly founded on my own obſervation; and as the opportunities I have had of treating this diſorder, and of being concerned with others in the management of it, in all the variety of ways we have mentioned, have been frequent and ample, I have delivered it without reſerve or difficulty.

To thoſe who are not thoroughly acquainted with the importance of the ſubject, it may perhaps appear that it has been here treated with more minuteneſs than is neceſſary; but I know I will not be conſidered as blamable in this particular by practitioners of experience.

We now proceed to conſider the third ſpecies of ſcrotal hydrocele, viz. that variety of the diſorder in which the water is collected in the cavity of a hernial ſac.

SECTION

* Tenth Edition, Chap. IX.
† *Vide* Critical Inquiry, Firſt Edition, p. 86.

SECTION IV.

Of the HYDROCELE *of a* HERNIAL SAC.

IN every ſpecies of hernia, when the parts have been long protruded, a quantity of a ſerous fluid collects in the bottom of the ſac; and if any obſtacle occurs to the abſorption of this, if the diſorder is ſeated in the ſcrotum, we can eaſily conceive the poſſibility of the tumor augmenting to ſuch a ſize as to afford all the uſual marks of a hydrocele: And accordingly, on conſulting the various authors who have written upon hernia and hydrocele, I find a number of caſes enumerated, which ſufficiently warrant the inſertion of this as a real, and perhaps not an unfrequent, variety of the diſorder.

It was well known to the ancients, that a conſiderable quantity of a fluid is frequently contained in the ſac of a hernia, along with the parts protruded from the abdomen; but Saviard ſeems to have been the firſt who entered into a particular conſideration of this occurrence. Le Dran relates different caſes of it: Heiſter ſpeaks of it under the title of Hydroentreocele: And the late Dr. Monro deſcribes it with his uſual accuracy, and mentions a caſe of this kind where ſix pounds of water were evacuated from the tumor by an opening made with the trocar.* A caſe of it is alſo related by Douglas,† and two caſes of a ſimilar nature are mentioned by Mr. Pott.‡

The water is in this diſorder confined in a cyſt formed by a proceſs of the peritonæum, and as it occupies nearly the ſame ſituation in the ſcrotum with the hydrocele of the tunica vaginalis, ſo we cannot, by the feel alone, on every occaſion, mark the difference between them. For although the teſticle in this ſpecies

* Monro's Works, p. 579.
† *Loc. cit.* p. 182.
‡ Treatiſe on the Hydrocele, p. 21.

ſpecies of hydrocele is commonly diſtinguiſhed more evidently at the lower and poſterior part of the ſwelling than in the hydrocele of the vaginal coat, yet the difference in this particular between the two diſeaſes is not always ſo evident as to prove a ſufficient mark of diſtinction.

When a portion of gut and other parts forming the hernia are down, the fulneſs they produce along the ſpermatic cord, ſerves in ſome meaſure to diſtinguiſh the diſorder from a ſimple hydrocele. And when, along with this and other ſymptoms of hernia, we evidently diſcover in the tumor of the ſcrotum a fluctuation of a fluid, if this fluid can by preſſure be made to diſappear either entirely or in part, the nature of the diſorder is thus rendered obvious.

This ſpecies of hydrocele may occur as readily in the hernia congenita as in any other variety of rupture, and in that event, the water muſt for certain be contained in the ſame ſac both with the teſticle and protruded inteſtines. Indeed, as all the fluid naturally ſecreted for keeping the ſurface of the different abdominal viſcera moiſt, muſt in the caſe of a congenital rupture fall into the hernial ſac, we would be induced to ſuppoſe that almoſt every caſe of this kind of hernia ought to be complicated with the diſorder we are now deſcribing. The two caſes of this ſpecies of hydrocele related by Mr. Pott, we find to have been connected with a hernia congenita; and I have myſelf ſeen two inſtances of the ſame kind. But whether this commonly happens or not, farther obſervation will diſcover.

Whatever ſpecies of hernia this kind of hydrocele may be connected with, if the water can by preſſure be made to paſs into the abdomen, this will always prove a certain characteriſtic of the diſeaſe; for in no other ſpecies of encyſted hydrocele is it poſſible to make the water diſappear by preſſure. It may happen, however, in this kind of hydrocele, that this diſtinguiſhing

tinguiſhing ſymptom of the diſeaſe does not exiſt; for if by the preſſure of a truſs, or from any other cauſe, an adheſion is produced in the groin between the ſides of the hernial ſac, if the under part of the ſac continues open with water collected in it, the tumor which it occaſions will afford all the uſual appearances of a hydrocele, while no part of its contents can be made to paſs into the abdomen by preſſure: A caſe of this kind we find related by Le Dran, where the neck of the hernial ſac was ſhut completely, and a hydrocele formed in the under part of it.

In ſuch a caſe, the only means of diſtinction will be, an acquaintance with the previous hiſtory of the diſorder. Whenever in an ambiguous caſe of this kind it is found, that, before the water began to collect in the ſcrotum, the patient had been liable to a hernia of the ſame ſide, this circumſtance alone will tend much to determine the nature of the diſeaſe. But even although a miſtake ſhould occur here, and although this ſpecies of hydrocele ſhould be conſidered by a practitioner as a ſimple hydrocele of the tunica vaginalis, nothing bad could enſue from it; for the treatment adapted to one ſpecies of the diſeaſe, would apply with nearly equal propriety to the other.

But when the protruded parts ſtill remain down, unleſs the operation for the bubonocele is at the ſame time ſubmitted to, no other operation ſhould be attempted than that of diſcharging the water by a puncture with a ſmall trocar, when the ſize of the tumor renders ſuch a ſtep neceſſary. For unleſs it was intended to perform the operation for the hernia at the ſame time, much miſchief might enſue from expoſing the bowels to the external air, by laying the tumor open for a radical cure of the hydrocele.

Whenever in this ſpecies of hydrocele it is reſolved to have recourſe to the radical cure, the ſimple inciſion ought unqueſtionably to be employed; as from the riſk of injuring the bowels or other parts protruded

ed from the abdomen, neither the ſeton nor cauſtic are here admiſſible. Indeed this conſideration of itſelf affords a very ſtrong argument in favour of the method of treating the hydrocele in every inſtance by inciſion, which lays all the parts concerned in the diſorder open to view: The very poſſibility of a patient being killed by a ſeton paſſing through a portion of inteſtine contained in a hydrocele, is a weighty objection againſt the ſeton being ever uſed; and every practitioner muſt acknowledge, that when the ſpermatic proceſs along the groin is much diſtended, and when the vaginal coat of the teſtis is much thickened, ſuch uncertainty often occurs as to render it impoſſible for the moſt ſkilful ſurgeons to determine with preciſion what the contents of ſuch ſwellings really are. In the two inſtances above alluded to, of a hydrocele connected with a congenital hernia, and which I met with ſome years ago, there had not been previouſly in either of them any cauſe to ſuſpect the real nature of the caſe. They were both by ſkilful practitioners taken to be collections of water in the tunica vaginalis without any complication whatever; and in each of them, on the tumor being laid open, together with water in contact with the teſticle, a piece of inteſtine was found protruded into the upper part of the ſcrotum: In one of the caſes, too, a ſmall portion of omentum accompanied the gut.

In this laſt, it was propoſed, at a conſultation of different ſurgeons, to employ the ſeton. For ſome reaſon or other, this was fortunately rejected; for, on laying the tumor open by inciſion it evidently appeared, that if a cord had been introduced, it muſt in all probability have paſſed through the protruded gut. The mere poſſibility, therefore, of ſuch an occurence, I would conſider as a very material objection to the method of treating any caſe of encyſted hydrocele by the ſeton.

SECTION V.

Of the ANASARCOUS HYDROCELE *of the* SPERMATIC CORD.

IN the anatomical deſcription we gave of theſe parts, it was obſerved, that, ſoon after the deſcent of the teſtis, the paſſage along the ſpermatic proceſs of the peritonæum is completely obliterated, by the ſides of the paſſage adhering to one another through the intervention of cellular ſubſtance.

By external preſſure, and perhaps from other cauſes, this adheſion of the ſides of the peritonæal proceſs in general is very firm in that part of it which paſſes along the groin; but the ſuperior and more internal part of the proceſs, is not only more looſe in itſelf, but is connected with and enveloped in a very looſe cellular ſubſtance.

From this cellular ſtructure of theſe parts we might *à priori* ſuppoſe them to be liable to œdematous ſwellings, which other parts of the body of a ſimilar ſtructure are frequently attacked with: And accordingly we find this proceſs of the peritonæum liable to partake of every anaſarcous ſwelling with which the reſt of the body is attacked: It ſometimes accompanies aſcites; and it now and then appears as a local diſorder, without being combined with either of theſe.

The cauſes of this diſorder in general are, obſtructions produced in the lymphatics of the part, by ſcirrhous affections of the liver, ſpleen, and other abdominal viſcera: I have likewiſe known it induced by the preſſure of a truſs applied for the cure of a hernia.*

When a ſwelling of this kind is connected with a general anaſarcous affection, the nature of the diſorder is ſo diſtinctly marked as to render a particular deſcription

* An inſtance of this kind is alſo mentioned by Douglas. *Treatiſe on the Hydrocele.*

ſcription of it unneceſſary. When it occurs as a local diſeaſe its appearances are theſe: A colourleſs tumor in the courſe of the ſpermatic cord; ſoft and inelaſtic to the feel, and not attended with fluctuation. In an erect poſture, it is of an oblong figure; but in a recumbent poſture of the body, it becomes more flat, and ſomewhat round. It does not commonly occupy more than the uſual ſtretch of the cord along the groin; but on ſome occaſions, it extends down the length of the teſticle, and even ſtretches the ſcrotum to an enormous ſize.* By preſſure the ſwelling can be always made to recede, if not entirely, at leaſt in great part, into the cavity of the abdomen; but it inſtantly returns to occupy its former ſituation on the preſſure being withdrawn.

When a tumor of this kind depends upon a general anaſarcous ſwelling of the body, unleſs the cauſe which gave riſe to the original diſeaſe of the conſtitution be removed, it would be a vain attempt to endeavour to cure this particular ſymptom: And it commonly happens, that theſe ſwellings in the groin which occur in the anaſarca diſappear, when the diſeaſe of the ſyſtem at large is carried off.

But when a ſwelling of this nature occurs as an original diſorder; produced perhaps by ſome local cauſe; a local remedy is then the only means neceſſary to be employed. In ſuch a caſe, as we have not the general bad habit of body to encounter, which commonly occurs in caſes of ſcrotal anaſarca, we need not be ſo much afraid of making a free large inciſion into the tumor; and accordingly all that is neceſſary to be done here, is this: As ſoon as the ſwelling has acquired ſuch a ſize as to become inconvenient, an inciſion ſhould be made with a ſcalpel from one end of it to the other, taking care to go ſo deep as effectually to evacuate all the water contained in the cells of the part;

* A remarkable inſtance of this is related by Mr. Pott, who from a ſwelling of this kind diſcharged eleven Engliſh pints at once. *Treatiſe on the Hydrocele*, Caſe X.

part; and as the water is now and then found to have acquired a viſcid conſiſtence, this circumſtance renders a deep inciſion more neceſſary than it otherwiſe would be.

The contents of the ſwelling being all removed, ſome ſoft lint ſhould be inſerted between the lips of the ſore, which muſt afterwards be treated in every reſpect as a ſimple wound from any other cauſe; by poultices and fomentations, if much pain and a ſcanty ſuppuration render theſe remedies neceſſary; and by a due attention to dreſſing ſo as to induce the formation of firm granulations from the bottom.

SECTION VI.

Of the Encysted Hydrocele *of the* Spermatic Cord.

THE ſurrounding ſubſtance of the ſpermatic cord being altogether cellular, the formation of encyſted tumors, we may conclude, ought here to be as frequent as in other parts of the body; and accordingly we find in ſome inſtances, that water, inſtead of diffuſing itſelf over the whole ſpermatic proceſs, is collected in one or more diſtinct cells or cyſts.

This kind of hydrocele being on its firſt appearance very ſmall, gives little or no trouble, and is therefore ſeldom much noticed till it has acquired a larger ſize. On ſome occaſions, the ſwelling begins in the ſuperior part of the proceſs; but in general, it is firſt obſerved towards its lower extremity a little above the epididymis. By degrees, however, it ſtretches upwards, and on ſome occaſions ſo far downwards as to reach from the abdominal muſcles to the very bottom of the ſcrotum; in which caſe, a perſon not verſant in diſorders of this nature, may very probably miſtake this ſpecies of hydrocele for a collection in the tunica vaginalis teſtis: But we have here a very

characteriſtic

characteriſtic diſtinction between the two diſeaſes. In the commencement of this ſpecies of ſwelling, the tumor is always above the teſticle, which is diſtinctly felt below it; and even in the moſt advanced ſtages of the diſorder, the teſtis is found lying at the back part of it, perfectly unconnected with the ſwelling: Whereas, in the advanced ſtate of a hydrocele of the tunica vaginalis, although ſome degree of hardneſs is always diſcovered at that part where the vaginal coat adheres to the teſticle; yet in the latter period of that diſorder, when the ſwelling is conſiderable, the teſtis itſelf can never be diſtinctly felt. In the ſpecies of hydrocele we are now deſcribing, the figure and ſize of the penis is not commonly ſo much altered, as when the water is collected in the tunica vaginalis, when the penis is frequently made to diſappear almoſt entirely.

In other particulars, the encyſted dropſy of the ſpermatic cord is very ſimilar to the hydrocele of the tunica vaginalis teſtis. A fluctuation of a fluid is evidently diſcovered on preſſure: The tumor is commonly of a pyramidal form, as is generally too the caſe with the other, with its baſe or largeſt extremity downwards:* And no preſſure has any influence in making it diſappear either altogether or in part.

This is the appearance of the diſorder when the water is contained in one cyſt; when it is ſeparated into two diſtinct cells, the line of diviſion is commonly evident, by the tumor being at that part ſomewhat puckered, or ſometimes a little diminiſhed in its diameter. A ſimilar appearance, we may obſerve too, takes place when this ſpecies of ſwelling is combined with a real hydrocele of the tunica vaginalis teſtis, which

* A Hydrocele of the tunica vaginalis teſtis is ſo frequently of a pyramidal form, with its baſe downwards, that this ſhape may be conſidered as one of the characteriſtic appearances of the diſeaſe; every other tumor to which the teſtis and its coats are liable, being either more round, or of a more irregular ſhape.

which on ſome occaſions it is: And in that caſe a line of ſeparation is obſerved at that part where the upper extremity of the tunica vaginalis terminates.

We have already mentioned the means of diſtinction between this ſpecies of hydrocele and that of the vaginal coat of the teſtis. The only other affections with which it is in danger of being confounded, are the anaſarcous hydrocele of the ſpermatic cord; and a real hernia, either of the omentum, or of a portion of gut. From the former, however, as alſo from an omental hernia, it may in general be diſtinguiſhed by the feel. In neither of theſe can the fluctuation of a fluid be in the leaſt perceived, and to the touch they are both ſoft and inelaſtic; whereas, in this ſpecies of hydrocele, the tumor has a ſpringy kind of feel, and a fluctuation is evidently found in it. And in both the others, the ſwelling recedes more or leſs upon preſſure, which it never does in this ſpecies of encyſted hydrocele.

From a gut rupture it is chiefly diſtinguiſhed by the tumor beginning, not at the ring in the external oblique muſcle, as is the caſe in hernia, but farther down the cord: In the latter, too, the ſwelling commonly turns leſs on the patient getting into a horizontal poſture; and it is always conſiderably affected both by coughing and ſneezing; but no poſture, no preſſure, nor any accident whatever, alters the ſize of this variety of hydrocele. The abſence of other ſymptoms of hernia, too, is here material in the diſtinction: For there is neither pain in the tumor, nor in the abdomen; nor ſickneſs, vomiting, nor any interruption to the paſſage by ſtool, as there very commonly are in hernia.

Although all the ancient writers were quite unacquainted with the anatomy of the parts concerned in this diſorder, it is evident they were well aware of its exiſtence. We find it particularly deſcribed by Ægineta,

eta, Albucaſis, and afterwards by Fallopius, Wiſeman, &c. Arnaud, in his treatiſe on hernia, alſo takes notice of it, though not with much accuracy; and we find it more lately deſcribed with exactneſs, by the late Doctor Monro, by Douglas, and by Mr. Pott.

This ſpecies of hydrocele, as alſo the anaſarcous ſwelling of the cord, and the œdematous tumor of the ſcrotum, are all very frequent in infancy. In that tender age, however, they generally ſoon diſſipate, and in this they are much aſſiſted by the application of cloths dipped in ſpirit of wine; and I have ſeen much advantage produced by an application of a ſtrong infuſion of red roſe leaves, combined with a conſiderable proportion of alum. The late Doctor Monro adviſes the application of cloths warmed with the fumes of burning benzoin.

But in adults, the cyſt confining the water generally becomes ſo firm as not to be affected by any of theſe remedies. So that when it arrives at any conſiderable ſize, which it frequently does, either the means for the palliative or radical cure may be employed, as was recommended in the hydrocele of the tunica vaginalis teſtis.

When it is intended merely to avacuate the water by puncture, it ought to be done with a trocar, in the ſame manner as was directed for a hydrocele of the tunica vaginalis; taking care to introduce the inſtrument at the moſt depending part of the tumor. And again, when it is intended to effect a radical cure, the ſame means are to be employed which we formerly recommended in the other ſpecies of the diſeaſe. There do not here, indeed, occur the ſame objections to the uſe of the ſeton, as in the hydrocele of the tunica vaginalis from the preſence of the teſticle: And if we could in every ſpecies of hydrocele aſcertain with certainty the exact contents of the tumor, the ſeton might no doubt be employed here with ſafety and advantage: But as it is clear from what we have already ſaid upon

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this point, that no certainty of this kind can be obtained; and as a hydrocele of a hernial sac in which a portion of gut is contained, may be as readily confounded with this as with any other species of the disease; I would therefore without hesitation lay this method of cure entirely aside.

A material objection occurs to the method of cure by Caustic in this species of hydrocele, which is not applicable in the hydrocele of the tunica vaginalis, viz. the water being in some instances of this disorder collected in two or more distinct cysts; different cases of which I have met with, and similar occurrences are related both by Garengeot and Douglas.—Now in such an event, if caustic should be applied in the method recommended by Mr. Else, upon a small spot only, all the water would not be evacuated; and in order to obtain a complete removal of the disorder, it would be necessary to repeat the application of the caustic.

This, I think, is an additional reason for employing in all such instances the method of cure by incision; which by laying the tumor open from one end to the other, divides at once all the different cysts of which it may be composed, and saves the patient from that distress and disappointment which must always be experienced, on a complete cure not being obtained when good reasons had been previously given for expecting it. We would therefore advise the treatment by incision in this species of hydrocele, in the same manner as was recommended in the hydrocele of the tunica vaginalis; the mode of performing the operation, and the after treatment of the patient, being nearly the same in each.

We have thus enumerated all the kinds of hydrocele which can properly be considered as forming distinct varieties of the disorder. In doing so, as no disease is described but such as every practitioner of experience must have met with, and of which the symptoms

toms are clearly and distinctly marked; so it will not, I hope, be considered as an unnecessary degree of minuteness that I have particularly taken notice of them all.

I can by no means agree with some authors, particularly with Mr. Sharpe* and Mr. Else,† who think it might be better to confine the description of this disorder to two species. We need not indeed wonder at Mr. Sharpe speaking in this manner: For even at the late period in which he wrote, although the existence of all the varieties of the disease we have mentioned had been described by different authors, yet they were not till of late years understood with much accuracy; and it is very evident from Mr. Sharpe's writings on this subject, that his ideas of these disorders were in many respects more confused than could have been expected in one of his usual accuracy and penetration. But whatever was the case with Mr. Sharpe, it is truly surprising, that those who are unquestionably well informed in every circumstance relating to this disorder, and who must be convinced, from their acquaintance with dissection, of the existence of all the varieties of the disease that have been mentioned, should object to their being retained. Where no evident or marked distinction occurs between one tumor and another, an attempt to establish a difference would be useless, and therefore improper; but where appearances point out an obvious variety, it would surely be considered as an unpardonable neglect in an author to omit the detail of them.

In our description of the five different species of hydrocele, viz. the anasarcous swelling of the scrotum; the hydrocele of the tunica vaginalis testis; the hydrocele of the hernial sac; the anasarcous swelling of the spermatic cord; and the encysted collection in that part; it was necessary in going along to enume-

* Treatise on the Operations of Surgery.
† Loco citato.

rate the ſymptoms of each as they occur ſeparately and uncombined. It ſometimes happens, however, that one, two, or more of the different ſpecies occur at the ſame time in the ſame patient: On ſome occaſions I have met with three, and not unfrequently with two, varieties in the ſame perſon: The late Doctor Monro mentions an inſtance of four ſpecies of hydrocele being all combined in one caſe.*

In ſuch occurrences ſome difficulty and confuſion is, no doubt, to be expected; but practitioners in forming a judgment of their nature, muſt be entirely directed by a due attention to the various ſymptoms which uſually occur in a ſeparate ſtate in each variety of the diſeaſe.

We now proceed to the conſideration of the other varieties of falſe hernia; and firſt of the Hæmatocele.

* See his works, p. 576.

CHAP.

CHAP. VII.

OF THE HÆMATOCELE.

THE Hæmatocele is a tumor in the ſcrotum or ſpermatic cord, produced by extravaſated blood.

The uſual ſeat of ſuch tumors is in the tunica vaginalis of the teſtis; but on ſome occaſions they are ſeated in the ſpermatic proceſs, and now and then they are met with in the dartos.

Tumors of this kind are in general produced by the rupture of one or more blood veſſels, in conſequence of external violence. Blows upon the ſcrotum have produced ruptures of veins, not only in the cellular ſubſtance of the ſcrotum, but in the vaginal coat of the teſticle; and accidents of a ſimilar nature have produced ſimilar affections in the courſe of the ſpermatic cord: And as the parts in this ſituation are very lax and cellular, the rupture either of an artery, or of a vein of any conſiderable ſize, will always be attended with a plentiful extravaſation of their contents.

In the tunica vaginalis teſtis, this diſorder is frequently induced by the point of a trocar or of a lancet in tapping for a hydrocele, wounding ſome of the blood veſſels of the ſac, which in ſuch caſes are always much enlarged. In ſuch an occurrence, we are commonly rendered certain of what has happened, by the water drawn off being ſuddenly tinged with blood; but on other occaſions it does not appear till the water is all evacuated, and then a tumor of a conſiderable

erable ſize is frequently produced in the courſe of a very ſhort ſpace of time.

In ſome of theſe caſes where the bulk of water has been remarkable, the ſudden diſcharge of it, by taking away the ſupport which the veſſels of the part have been for ſome time accuſtomed to receive from it, has undoubtedly been the cauſe of the rupture of ſome of them; and from repeated obſervation I think it may be conſidered as a certainty, whenever a tumor is produced either in the ſcrotum or ſpermatic cord, ſuddenly after the water of a hydrocele has been evacuated by tapping, that it is entirely the conſequence of an extravaſation of blood; for collections of water are never known to arrive ſo quickly at a conſiderable ſize.

In the ſpermatic proceſs, injuries of the ſame kind will be attended with a ſimilar effect upon the ſmaller veins of the ſac containing the water; and more conſiderable violence has on ſome occaſions produced a rupture of the ſpermatic artery and vein.

But, in whatever way the tumor has been produced, the appearances are nearly ſimilar to thoſe of watery collections in the ſame parts, ſo that we do not conſider it as neceſſary to repeat them here: Only it may be obſerved, that when blood is extravaſated in the ſcrotum, it is eaſily diſcovered from a collection of water by the colour, it being in every reſpect a real Ecchymoſis. When the ſwelling is ſeated in the tunica vaginalis, the means of diſtinguiſhing between blood and water, is, that a tumor produced by the former, feels to be more heavy than water in proportion to its bulk; and they who are much accuſtomed to handle ſuch diſorders, are on many occaſions ſenſible of a difference of conſiſtence.

The treatment here is nearly the ſame that we have already recommended in caſes of hydrocele. In the commencement of the anaſarcous or diffuſed ſpecies of hæmatocele, when produced by a ſlight external violence,

lence, whether in the ſcrotum or ſpermatic proceſs, the application of ardent ſpirits, or of a ſolution of alum, will on ſome occaſions effect its diſcuſſion: But when this, upon trial, is not found to ſucceed, the tumor is to be laid open, and in every reſpect treated in the ſame manner as was directed for the hydrocele; only, if a ruptured blood veſſel is diſcovered, the only effectual means of preventing a return of the diſorder is to ſecure it by ligature.

In the ſame manner, all collections of blood, either in the vaginal coat of the teſtis, or in the cyſt of a former hydrocele of the ſpermatic cord, are to be laid open by an inciſion extending the whole length of the tumor, and are to be treated as we formerly directed for hydrocele. And, as we have already adviſed in the diffuſed ſpecies of hæmatocele, if any ruptured veſſel comes into view in the courſe of the operation, it ought to be immediately ſecured by ligature. It ſometimes happens, however, in affections of this kind, both of the ſpermatic proceſs and tunica vaginalis teſtis, that the veſſels from whence the blood is diſcharged cannot be detected; a very conſiderable oozing continuing from day to day, notwithſtanding the uſe of bark, vitriolic acid, and every other means commonly employed in ſuch caſes.

If, after a proper trial of all the ordinary remedies uſed in caſes of hæmorrhagies, the veſſels from whence the blood is diſcharged cannot be otherwiſe ſecured, the end in view may frequently be obtained by extirpation of the teſticle; which, in ſuch occurrences, is the only remedy from which any advantage is to be expected.

Another ſpecies of hæmatocele is taken notice of by Mr. Pott, in which the blood is contained within the tunica albuginea of the teſtis. It proceeds, he thinks, from a relaxation or diſſolution of part of the vaſcular ſtructure of the teſticle; and when the quantity of blood collected is conſiderable, it produces,

Mr.

Mr. Pott remarks, a fluctuation ſomewhat like to that of an hydrocele of the tunica vaginalis.

When this happens to be miſtaken for a hydrocele, as it has ſometimes been, and an opening with a trocar is made into it, a diſcharge is produced, of a dark duſky coloured blood, nearly of the conſiſtence of thin chocolate; but although ſome diminution may be made in the ſize of the tumor, by the evacuation thus obtained, yet no conſiderable alteration is effected by it.

Any perforation that is made into it, accordingly does no good; and as the teſticle is commonly ſo far ſpoiled by the diſeaſe as to be rendered quite uſeleſs, caſtration is adviſed as the only effectual remedy.*

I have different times met with a diſeaſe very ſimilar to this deſcribed by Mr. Pott: But as the blood in ſuch inſtances did not appear to be extravaſated, but to be ſtill contained in the veſſels of the teſtis in an enlarged varicoſe ſtate, I would not incline, therefore, to refer this kind of tumor to any ſpecies of hæmatocele. I have even ſeen this diſorder miſtaken for a hydrocele, and treated as ſuch, by a trocar being plunged into it, when the effects were juſt ſuch as are deſcribed by Mr. Pott. But, if the blood had been extravaſated, a more copious diſcharge ought to have taken place, in conſequence of the operation, than was procured by it in any of the caſes I have met with: Even where the tumor has been of a conſiderable ſize, I never found it poſſible to evacuate in this manner more than a ſpoonful or two of blood; and although in ſuch caſes the blood appears evidently to be thicker than it ought to be, yet it is by no means ſo much ſo as ſhould prevent it from being freely diſcharged by the canula of a trocar if it was lodged in a ſtate of extravaſation. But in all the inſtances I have ever ſeen of this diſorder, the blood appeared to be ſtill contained within its proper veſſels in an enlarged varicoſe

* Mr. Pott's Treatiſe on the Hydrocele.

varicoſe ſtate; ſo that, inſtead of conſidering ſuch a tumor as a variety of hæmatocele, I would rather refer it to a ſpecies of Varix.

In any caſes of this kind that have occurred to me, when the tumors were not opened, but were entirely truſted to the ſupport afforded by a ſuſpenſory, they have in ſome inſtances remained for many years without being productive of any miſchief: And they are commonly attended with this peculiarity, that when effectually ſupported by a bandage, they remain ſtationary for a great length of time, without acquiring any additional ſize; a circumſtance which no ſupport will prevent either in a hydrocele or in the real hæmatocele. But as ſoon as the tumor, by being miſtaken for a hydrocele, is touched with an inſtrument with a view to evacuate its contents, it is from that moment ſure to go wrong. The patient, from being previouſly liable to little or no pain, immediately on the tumor being opened becomes very much diſtreſſed; the ſwelling then begins to increaſe, and in a gradual manner to prove ſo troubleſome by frequent diſcharges of blood, as to render caſtration abſolutely neceſſary.

Even this diſagreeable reſource does not always prove a certain relief; for it ſometimes happens, that ſuch a ſpongy relaxed ſtate of the veſſels occurs along the whole courſe of the cord, that although they are ſecured by ligature today, the blood burſts out from different parts of the ſore tomorrow. I happened once to be concerned in a very melancholy inſtance of this kind: After the uſual operation of caſtration, freſh hæmorrhagies occurred at every dreſſing; the veſſels were at different times ſecured by ligature, but to no purpoſe; the blood burſt out again and again; and the patient, after ſuffering much diſtreſs, at laſt died.

The only difference which, before laying the parts open, can be obſerved between this ſpecies of tumor

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and a real hydrocele of the tunica vaginalis, is, that in this, the fluctuation in the ſwelling is never ſo evident as in the other; the tumor is heavy in proportion to its ſize; and if properly ſupported by a bandage, it does not receive any additional increaſe. Whenever theſe circumſtances, therefore, occur in the ſame caſe, it ought to afford much reaſon to ſuſpect that the ſwelling is of this nature, and that accordingly it ought not to be meddled with.

As I conſider this diſorder to be entirely of the varicoſe kind, I would not have thought of introducing the conſideration of it here; but as it was proper to mention its having been taken notice of by others as a ſpecies of hæmatocele, I thought it better to finiſh the diſcuſſion of it at once, than to be under the neceſſity of bringing it in again in a ſubſequent chapter.

CHAP.

CHAP. VIII.

OF THE VARICOCELE, CIRSOCELE, SPERMATOCELE, AND PNEUMATOCELE.

BY the firſt of theſe terms is meant, a varicoſe diſtention of the veins of the ſcrotum; which in this ſtate form a tumor of hard knotty inequalities, ſeldom attended with pain, and in general productive of no inconvenience except what ariſes from its bulk.

The Cirſocele is a tumor of a nature ſimilar to the former, in the courſe of the ſpermatic cord, extending from the ſuperior part of the ſcrotum to the abdominal muſcles, and produced by a varicoſe diſtention of the ſpermatic vein.

Both theſe affections are now and then produced, by obſtruction of one kind or another in the veins of theſe parts: But moſt frequently they depend on a debilitated relaxed ſtate of the veins.

When tumors in the courſe of the veins are detected as the cauſe of ſuch ſwellings, or when the preſſure of a hernial truſs upon the ſpermatic proceſs is diſcovered to be their origin; the removal of this evident cauſe of the diſeaſe ought to be the firſt attempt towards a cure.

If the preſſure of a truſs has been the cauſe of the ſwelling, an alteration in the bandage may probably remove it. If tumors of a hard ſcirrhous nature have produced it, their extirpation, when that is found to

be practicable, will be the moſt effectual means that can be employed; and if the tumors have any tendency to ſuppurate, warm emollient applications will be more uſeful than any other remedy.

But when a general relaxed ſtate of the veins is ſuſpected to give riſe to the complaint, ſuch remedies ought to be employed as will moſt effectually recover that tone, of which they have been deprived by being long overdiſtended. For this purpoſe nothing commonly anſwers ſo well as the uſe of a proper ſuſpenſory bandage; a horizontal poſture; the cold bath; and the application of a ſolution of alum and other aſtringents, to the parts affected.

By a due continuation of theſe means every affection of this kind may be always prevented from increaſing, and will commonly be ſo far relieved as to render the harſh means by the knife, the cautery, and ligature, recommended by ancient writers for the removal of ſuch tumors, unneceſſary.

By the term Spermatocele, is meant, a morbid diſtention of the epididymis and vas deferens, produced by a ſtagnation of ſemen. This may be produced by tumors, ſtricture, or inflammation, about the *caput gallinaginis*, or in the courſe of the *vas deferens*; but there is reaſon to think, that it is more frequently induced by the laſt, viz. by inflammation, than by either of the other two.

When an inflammatory affection of the parts is diſcovered to be the cauſe of the diſeaſe, general and topical bloodletting, gentle laxatives, a low cooling diet, and reſt of body, will commonly be found the moſt effectual remedies. And again, when tumors are diſcovered to preſs upon the *vas deferens*, they ought either to be brought to ſuppurate, or their extirpation ſhould be attempted when that can be done with propriety. At other times, theſe tumors are found to depend on a venereal cauſe; and in ſuch inſtances

ſtances a well directed courſe of mercury has been known to remove them.

On ſome occaſions we are told, that all the other means having failed, caſtration has at laſt been found requiſite. This, however, we cannot ſuppoſe to be ever a very neceſſary meaſure.

The term Pneumatocele, is applied to ſignify a diſtention of the ſcrotum by a collection of air.

This has been deſcribed by moſt of the ancient writers as a very frequent occurrence; but there is much reaſon to think, that a great proportion of all the tumors they take notice of as containing air, were either formed by collections of water, or by a protruſion of ſome of the bowels. That ſpecies of hernia to which young children are liable, is to this day by our common people termed a Wind Rupture; as are all thoſe collections of water in the ſcrotum with which new born infants are affected: But we know well, that none of theſe tumors are formed merely by wind; their contents being of a very different nature.

In wounds of the lungs, air is ſometimes thrown into the ſurrounding cellular ſubſtance, and in that way paſſes into the ſcrotum, as it does in particular inſtances over the whole body; and in high degrees of putrid diſeaſes, ſo much air may be ſeparated from the blood, as to diſtend the cellular ſubſtance of the ſcrotum, as well as of other parts: But a real pneumatocele has never, probably, exiſted as a mere local affection of the ſcrotum; at leaſt I have never ſeen it.

In the caſe of air diffuſed into the cellular ſubſtance of theſe parts, in conſequence of a wound or any other affection of the lungs producing an extravaſation of it, the ſame method of cure will anſwer for its removal that we recommended for anaſarcous ſwellings formed by water, viz. ſmall punctures with the point of a lancet, which are found to be fully ſufficient for evacuating great quantities of air. But whenever the diſeaſe

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is induced by ſuch a great degree of putreſcency in the ſyſtem as is neceſſary for effecting a ſeparation of air from the blood, there can be little reaſon to expect any advantage to reſult from whatever means may be employed for relief.

CHAP.

CHAP. IX.

OF THE SARCOCELE, OR SCIRRHOUS TESTICLE.

BY the term Sarcocele, is underſtood, a firm fleſhy kind of enlargement of the teſticle: A ſimple inflammatory affection of the teſtis affords a tumor of ſome degree of firmneſs; but the true ſarcocele, or ſcirrhous teſticle, is attended with a hardneſs never to be met with in the real hernia humoralis or inflamed teſticle.

A ſcirrhous teſticle, in the courſe of its progreſs, puts on ſuch a variety of appearances, as renders it difficult by deſcription to give an adequate idea of it: In general, however, the acceſſion and progreſs of the diſeaſe is as follows.

An unuſual degree of hardneſs, attended with a trifling enlargement of the whole teſtis, proves in general to be the firſt indication of the diſeaſe: In the beginning no diſcolouration is obſerved, nor is there any material pain: In a gradual manner the tumor acquires a larger ſize: As yet it remains ſmooth and equal on its ſurface; but with the ſize of the ſwelling, the hardneſs alſo becomes more remarkable: Slight pains are at times felt through the ſubſtance of the tumor; and if it be not ſuſpended the patient complains of ſome uneaſineſs in his back.

When there is nothing particularly bad in the conſtitution, the diſorder will on ſome occaſions remain in this ſituation for a great length of time; and in a few inſtances, by a moderate diet, keeping an open belly, ſuſpending the tumor properly, and avoiding violent

violent exercise, the disorder has not only been prevented from increasing, but has in a gradual manner dissipated: Such favourable occurrences, however, it must be owned, are exceedingly rare; for the swelling, instead of discussing, or remaining stationary, in general proceeds with more or less rapidity to turn worse. The tumor acquires a larger size; becomes ragged and unequal on its surface; and the pain, which at first was trifling, becomes more severe, darting, in smart stings, through the substance of the tumor.

The inequalities on the surface of the tumor by degrees increase, and continue to retain the same kind of hardness with the swelling from which they originate: On some occasions, a considerable quantity of serum is extravasated into the *tunica vaginalis*, which, to those not acquainted with the nature of such disorders, gives the tumor the appearance of a common hydrocele: And at other times, instead of such depositions into the vaginal coat, partial collections of matter are formed through the whole body of the tumor: These by degrees increase; and the scrotum, which has hitherto been gradually distending, at last bursts, and a discharge takes place from the various collections in the body of the tumor, of a thin, fetid, bloody matter.

On some occasions, the spermatic cord becomes hard and enlarged soon after the commencement of the disease; but in general the cord does not become affected till the tumor has acquired a considerable size, and most frequently, I have observed, not till matter has formed in some part or other of the swelling.

As the disorder of the testicle advances, this affection of the cord also becomes worse: From being at first only slightly tumefied, it gradually turns more hard and swelled; it becomes very painful, and knotty or unequal through the whole extent of it.

The discharge from the openings in the scrotum still continues: But although the matter increases in quantity, the size of the tumor is not thereby diminished;

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on the contrary, it ſtill continues to increaſe: The edges of the ſore become hard, livid, and retorted; and fungous excreſcences puſh out from different parts of it.

Whatever was the ſtate of the patient's conſtitution on the firſt attack of the diſeaſe, in this advanced ſtate of it, it is always greatly impaired: He now becomes emaciated; of a pale, wan complexion; and the diſorder, which in this ſtage of it is a real cancer of the moſt malignant nature, turning ſtill more virulent, by the pain becoming more tormenting, the patient is at laſt carried off in very great miſery.

Such, in general, is the progreſs and event of this dreadful diſorder, if it be not interrupted by extirpation of the teſticle before the ſwelling has proceeded too far. We have already ſaid that it exhibits a great variety of ſymptoms: Thoſe here enumerated occur moſt frequently; but no deſcription can convey a clear idea of all the appearances it aſſumes. On ſome occaſions, we have already obſerved, it remains apparently in an indolent, inactive ſtate, for a great length of time, even for years; and in others, it proceeds ſo rapidly, that in the ſpace of a few months it has been known to paſs through all the various changes we have enumerated.

In by much the greateſt proportion of ſuch affections the diſorder begins in the body of the teſtis, affecting the whole of it equally; but now and then it makes its firſt appearance in the epididymis, and ſometimes even in the ſpermatic cord. It has been a prevailing opinion, indeed, that a ſcirrhous hardneſs tending to cancer, never does begin in the epididymis; but that the teſticle is always firſt affected. This is certainly the caſe in general; but every practitioner muſt at times have met with caſes of a real cancerous nature beginning in the epididymis, and ſometimes even in the ſpermatic cord, and ſpreading from thence to the neighbouring parts.—I might here inſert different

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caſes of this nature, which have fallen within my own obſervation; but Mr. Pott's collection furniſhes a ſufficient number of well marked examples of the fact.*

In almoſt every caſe of a ſwelled teſticle from a gonorrhœa, the epididymis is not only affected before the teſticle, by the inflammation in ſuch caſes ſpreading from the urethra along the vas deferens, when of courſe it muſt firſt reach the epididymis; but the diſorder in ſuch caſes, when it begins to yield, always firſt removes from the teſticle, leaving in general a ſcirrhous hardneſs in the epididymis, which on ſome occaſions in the courſe of time diſſipates entirely, and in others remains of the ſame degree of hardneſs for a conſiderable time, and now and then even for life. But as the hardneſs produced in this manner is merely the conſequence of inflammation upon a membranous or vaſcular part; ſo here as in other parts of the body of a ſimilar texture, we ſeldom find, that hardneſs thus induced terminates in any thing bad.

The contrary, however, of this has been too much inculcated. It has been ſaid, that the hernia humoralis produced by a venereal infection, is a frequent cauſe of the worſt kind of ſcirrhous teſticle; which, as the fact is very much otherwiſe, has this improper tendency, that it prevents the uſe of, and a proper perſeverance in, ſuch courſes of medicine, as might, without the neceſſity of extirpation, have removed it: There have even been inſtances of this idea being ſo improperly applied, as to be the means of different teſtes being extirpated, which were evidently diſeaſed from a venereal cauſe, and which by proper courſes of mercury might in all probability have been removed.

But although I have ſaid that affections of this nature, I mean a ſwelling of the teſtis from a venereal cauſe, are very ſeldom known to end in any thing bad; yet I will not go ſo far as to ſay that they never do ſo: For I know, that a hardened ſtate of the teſtis and

* Treatiſe on the Hydrocele, Caſes 42. 48. and 49.

and epididymis, produced originally by a venereal taint, does in some instances degenerate into the worst species of sarcocele; that is, that though affections of this kind do most frequently terminate easily, yet that now and then in particular constitutions, whose peculiarities, however, we are not acquainted with, they do certainly produce scirrhosities of the very worst kind, when such ailments would never probably have appeared if the original venereal taint had not occurred as an exciting cause of the disorder. We know well, that a predisposition to different disorders will remain long in a latent state in the system, without being productive of any evident affection, till the application of some particular stimulus brings it into action: In the same manner, a venereal inflammatory affection of the testis, will in some constitutions terminate in much mischief, although in general its effects in this way are by no means to be dreaded.

I have dwelt longer upon this point than I otherwise should have done, from a contrary doctrine having been strenuously inculcated by one whose authority is deservedly great, and whose observation in this disease has led to the conclusion he endeavours to establish:* But as all the experience I have had in these matters, has led me to form the opinion here delivered, I could not avoid stating it in the manner I have done.

In the treatise alluded to, we are told, that a hernia humoralis is never, in any one instance, productive of this disease. If on this subject Mr. Pott's idea is just, it ought undoubtedly to be received: But if it is not, it may very certainly do mischief, by rendering both patients and practitioners more remiss in cases of sarcocele proceeding from this cause than they otherwise would be; as, by continuing still in hopes of a mercurial course being able to effect a cure, they may thereby allow the disease to go too far even for extirpation to be advisable.

* Mr. Pott, *Treatise on the Hydrocele*, &c. p. 232.

In every doubtful caſe of this kind, when a venereal infection is ſuſpected as the cauſe of the diſeaſe, blood-letting when the pulſe is full; an open belly; a cooling diet; a horizontal poſture; with a proper ſuſpenſory bandage; and a well directed mercurial courſe, will very commonly remove it. But when in ſuch inſtances the means recommended are put in practice without any evident advantage; and eſpecially if, during their application, the diſorder, inſtead of mending, turns gradually worſe; as ſoon as from its increaſe in ſize there appears to be any riſk of its advancing beyond the reach of operation, it ought then at all events to be extirpated, whatever the cauſe which originally produced it may have been.

Among other cauſes mentioned by authors as being productive of a ſcirrhous ſtate of the teſticles, is the hydrocele of the tunica vaginalis. From quantities of a watery fluid being frequently found in the vaginal coat of a ſcirrhous teſticle, it has been ſuppoſed, that the water in ſuch caſes was the original cauſe of the diſeaſe in the teſtis, and not the conſequence of it. There is every reaſon, however, to think, that in theſe collections of water in the vaginal coat, in which the teſtis is found diſeaſed, that the hardened ſtate of that organ ought to be conſidered as the original diſorder, and not the quantity of water which ſurrounds it.

Collections of water are no doubt often met with, even in the real ſarcocele; but this ought to be conſidered only as a different ſtage of the ſame diſeaſe: For although the true ſcirrhous teſticle is never at firſt attended with any collection of this nature, it is natural to ſuppoſe, that a hard diſeaſed ſtate of that viſcus muſt have ſome influence in producing an alteration in the quantity of fluid with which the tunica vaginalis is always provided in a ſound healthy ſtate. If it either produces an augmented ſecretion, or a diminiſhed abſorption of that fluid, a dropſical ſwelling muſt be the certain conſequence; and every ſuch collection, combined

combined with a ſcirrhous teſticle, has been very properly termed a *hydroſarcocele.*

That the teſtis, by remaining long immerſed in the water even of a true hydrocele, does frequently become ſomewhat altered in its texture, there is no reaſon to doubt. Thus, as we have elſewhere obſerved, on laying open the tunica vaginalis, the teſtis in that diſorder is always found to be of a more pale appearance than it naturally ought to be: On ſome occaſions it is very much diminiſhed, and on others conſiderably enlarged; but all ſuch enlargements, when connected with a real hydrocele, are of a ſoft harmleſs nature, ſuch as never give any pain; and in this ſtate the teſtis ought never to be extirpated.

This is a point, we may remark, which it is of ſome importance to aſcertain: For on the idea of theſe enlargements of the teſtes, frequently connected with, and perhaps produced by, their immerſion in the water of a hydrocele, being of a real ſcirrhous nature, their extirpation has been often adviſed, and unfortunately too often practiſed.

In circumſtances of this kind the means of diſtinction between the mild and malignant ſpecies of enlarged teſticle, by which we ſhould in general be directed, are the following.

When the body of the teſtis becomes hard and enlarged, previous to any collection of water in the tunica vaginalis, ſuch collections as afterwards occur ought not to be conſidered as conſtituting a ſimple hydrocele; and if, upon evacuating the water by inciſion, the teſtis, beſides being enlarged, is found in a hardened ſtate, and eſpecially if it is attended with pain, and is ulcerated on the ſurface, extirpation ought undoubtedly to be adviſed immediately: And, on the contrary, when the water of a hydrocele is known to have been collected while the teſticle remained ſound and of its natural ſize, whatever enlargement it may be found to have acquired on laying the ſac open, if

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the teſtis is neither of a ſcirrhous hardneſs, nor affected with pain or ulceration, we ought unqueſtionably to proceed as in a caſe of ſimple hydrocele; for any enlargement of this kind will be rarely found to occaſion future uneaſineſs, and conſequently will ſeldom or never render extirpation neceſſary.

In forming a prognoſis of this diſorder, different circumſtances are to be attended to; the age, and habit of body, of the patient; the duration of the diſeaſe, and the ſtate it is in at the time.

Thus, whatever treatment is to be adopted, more ſucceſs may be reaſonably expected in a young healthy conſtitution than in the reverſe; particularly if extirpation of the teſtis is to be adviſed. In the former, the chance of ſucceſs from the operation is commonly conſiderable, provided the diſorder be not too far advanced; whereas in old, infirm people; and in habits attended with pale, wan complexions; with indigeſtion; and other ſymptoms of obſtructed viſcera; whatever ſtate the diſeaſe may be in, little or no advantage can be expected to accrue from any operation.

With reſpect to the duration of the diſeaſe, if it has already ſubſiſted for a conſiderable time without making much progreſs, there will be great reaſon to think that it is of a mild nature; and that the ſyſtem, in general, is not ſo much affected by it as if its progreſs had been great and rapid; and laſtly, the ſtate of the diſorder for the time is of much importance in forming an opinion of its final event. As long as the teſticle is only ſomewhat hard and enlarged, without the formation of matter, and without any diſeaſe of the cord, if the conſtitution is otherwiſe healthy, there will be much reaſon to expect a favourable event from any operation that ought to take place.

But on the contrary, when the diſorder is ſo far advanced that collections of matter have formed, either upon the ſurface of the teſticle, or in its more internal parts, as in that ſtate the conſtitution will probably have

have ſuffered from abſorption, ſo there is leſs chance of the operation in theſe circumſtances proving ſo ſucceſsful as in the more early period of the diſeaſe: And this is ſtill more remarkably the caſe when the tumor has become ulcerated externally; for we know well, that in all ſuch caſes, the ſyſtem is much more apt to ſuffer from abſorbed matter on the parts being laid open, than while they remained excluded from the external air.

In whatever ſtate, however, the tumor may be, there is always reaſon to expect more ſucceſs from the operation while the ſpermatic cord is yet ſound, than when it has become much diſeaſed; for, as ſoon as the cord is materially affected, the chance of ſucceſs from any means to be attempted is always proportionably leſſened. The cord, indeed, may towards its under extremity be diſeaſed, even in the ſame manner with the teſtis itſelf, without leſſening the chance of benefit from the operation; but whenever the diſorder has ſpread ſo far up the ſpermatic proceſs as to render it doubtful whether the parts affected can be all removed by the knife or not, and eſpecially when it is once rendered clear that the cord is diſeaſed within the boundaries of the abdomen, inſtead of there being in ſuch circumſtances any advantage to be expected from the operation, every attempt towards the removal of the parts below, will for certain tend to aggravate every ſymptom, and will be a means therefore of forwarding the patient's death.

Whenever a ſcirrhous or cancerous tumor is ſo ſituated as to render its total removal by the knife quite practicable, it ought always to be adviſed; but when the diſeaſe has advanced ſo far as to render this impoſſible, in whatever part of the body it may be ſituated, no attempt of this kind ought to be made, the fact being now clearly aſcertained, that cancerous affections are always rendered worſe by extirpation, when all the diſeaſed parts cannot be removed.

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It is of much importance, however, to obſerve, that the ſpermatic cord is in this diſorder frequently affected with a fulneſs and thickneſs of its parts, produced merely by the weight of the tumor, without being in any other reſpect diſeaſed. A fulneſs of this kind, when no pain occurs in the cord itſelf, and when there are no knots or inequalities upon its ſurface, ought never to prevent the operation, when in other reſpects it appears to be neceſſary; as a mere enlargement of it very frequently occurs, either from a varicoſe ſtate of the veſſels, or from a watery depoſition in the cellular ſubſtance of the part, when the proceſs is not in any other manner diſeaſed.* But on the contrary, when the cord, at the ſame time that it has become conſiderably enlarged, hard, and knotty, adheres to the neighbouring parts, is painful to the touch, and eſpecially if it is already ulcerated; theſe, if the diſorder extends over the whole proceſs up to the abdominal muſcles, are circumſtances which, with every prudent practitioner, will at all times forbid the operation of caſtration.

It has indeed been propoſed, in ſuch a ſtate of the cord, to enlarge the opening in the external oblique muſcle, ſo as by diſſection to trace the diſeaſed parts even into the cavity of the abdomen, with a view to extirpate them entirely. But although theoretical writers may attempt to amuſe their readers with ſuch propoſals, they will never be ſeriouſly thought of by practitioners whoſe opportunities for obſervation enable them to think and act for themſelves.

We do not think it neceſſary to ſay any thing, either of the effect of internal medicines, or of external applications, in the removal of this diſeaſe; for in the real ſarcocele, or ſcirrhous teſticle, no remedy with which we are acquainted has any kind of influence.

Even

* Of what is here inculcated we have ſome ſingular proofs in Mr. Pott's Collection of Caſes, which we have ſo often referred to as a depoſitory of uſeful facts. See Caſes xxxix. xl. xlix. and l. Treatiſe on the Hydrocele.

Even cicuta, the powers of which are ſo much extolled, does not appear to be in any degree uſeful, either in carrying off the diſorder entirely, or in mitigating any of its ſymptoms. The only remedy, therefore, from which we at preſent reaſonably expect any advantage, is the removal of the diſeaſed parts by extirpation; ſo that the moſt important matter to be here determined, is that period of the diſeaſe in which the operation is moſt adviſable.

We have already obſerved, that caſes of ſcirrhous teſticle do now and then occur with which patients go about for a great length of time with little or no inconvenience: Such inſtances, however, are exceedingly rare; for, by much the greateſt proportion of all ſuch affections, prove to be of a dangerous malignant nature.

With reſpect to this point, therefore, we may ſhortly determine, that, whenever a ſcirrhous or hardened ſtate of the teſticle does not yield to the means commonly employed, ſuch as moderate evacuations of blood when theſe are indicated; a ſoft eaſy diet; a lax belly; the uſe of a ſuſpenſory bandage; and eſpecially when mercury, which, on the chance of the diſorder being venereal, is very commonly tried, all are uſed without any effect; we may in ſuch circumſtances always have great cauſe to ſuſpect that the diſeaſe is of a truly bad nature. When more inveterate ſymptoms appear; when the tumor, which till now was in a hard indolent ſtate, becomes painful, and is evidently going on to acquire an additional bulk; no farther delay ought then to be adviſed: For however improper it would be to remove a hardened teſtis, which for a conſiderable time had remained indolent, without pain or any increaſe in bulk, yet it would be equally unpardonable in any practitioner to recommend a delay of the operation when matters are ſo far changed that the tumor is become painful, and is daily becoming larger. In ſuch circumſtances, the

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ſooner the diſeaſed parts are removed, the greater will be the chance of a recovery, and not a day therefore ſhould be loſt. For whatever may have been the opinion of a few individuals on this point, it has long been a fixed maxim with the moſt experienced ſurgeons, that, in all ſcirrhous or cancerous affections, the riſk of a relapſe after the operation is commonly in proportion to the duration of the original diſeaſe.*

The extirpation of the teſticle being at laſt determined upon, the method of performing the operation is this; The patient muſt be placed in a horizontal poſture on a table of a convenient height, with his legs hanging down, to be firmly ſecured by an aſſiſtant on each ſide. The parts being previouſly ſhaved, if the tumor is very large, an aſſiſtant muſt be employed to ſecure it properly; if only, however, of a moderate ſize, it is better for the ſurgeon to do it himſelf. With one hand, therefore, he ought to graſp the ſwelling ſo as to keep it firm, and with a ſcalpel in the other ſhould make an inciſion along the whole courſe of it, beginning at leaſt an inch above the part where the cord is to be cut, and continuing it through the ſkin and cellular ſubſtance to the inferior point of the ſcrotum. The eaſieſt method of doing this, we may obſerve, both for the ſurgeon and patient, is by one continued ſtroke of the knife; as it is both more quickly and more neatly performed in this manner, than in the uſual way of pinching up the ſkin between the finger and thumb before cutting it; and there is no kind of difficulty or riſk in doing it in the manner we have here directed.

The ſpermatic cord being thus laid bare, the ſurgeon is now with the finger and thumb of one hand to endeavour to ſeparate the ſpermatic arteries and veins

* The opinion of the late Mr. Sharpe on this point was ſingular in a man of ſuch extenſive experience. He conſidered the riſk of a relapſe after extirpation in cancerous tumors to be greater in the more early periods of theſe diſeaſes than in their more advanced ſtates. *Critical Inquiry*, 4th edit. p. 108.

veins from the *vas deferens*; which is for the moſt part eaſily done, and which ought never to be omitted, for it is in no degree neceſſary to include the nerve in the ligature: And this being done, a firm, waxed, flat cord, compoſed of a number of ſmall threads, is by means of the curved needle, Plate V, fig. 4, to be carried round the blood veſſels, which are thus to be ſecured by a running knot about a quarter of an inch above that part of the cord which is to be divided.

The cord being at this part cut acroſs, the teſticle is then to be entirely removed by diſſecting the cord and it from above downwards, ſo as to ſeparate them as eaſily as poſſible from the ſurrounding parts. Different contrivances have been propoſed for facilitating the ſeparation of the teſtis from the contiguous parts; but no invention with which we are acquainted anſwers this purpoſe ſo well as a ſcalpel.

When the diſeaſed parts are all removed, the knot upon the cord ſhould be united, in order to diſcover the ſpermatic artery and vein, which by means of the tenaculum may generally be ſeparated from the nerve with which they are in contact; and whenever this can be done, they ought unqueſtionably to be ſecured in this manner; for, by including the nerve, no advantage whatever is obtained, and it always renders this a very painful part of the operation. I have ſeen more pain, indeed, complained of in tying the ſpermatic cord in the uſual way, than I was ever witneſs to in any part of almoſt any operation; ſo that whenever the nerve can be ſeparated from the other parts, as it very commonly with a little attention may be, it ought always to be left out of the ligature.* When it ſo happens, however, that this cannot be done, the ligature muſt then be applied in the ordinary manner, and be made to ſurround the blood veſſels and nerves indiſcriminately; care being taken to make no more

* *Vide* Chirurgical Caſes and Obſervations, by Mr. Bromfield, Vol. I. p. 336.

preſſure with the knot than is juſt neceſſary for the preventing any diſcharge of blood.

We have deſired, that in ſecuring the divided blood veſſels, both the artery and veins ought to be tied; for if the veins are not included in the ligature, a good deal of blood may be diſcharged from them, as they are not furniſhed with ſo many valves as the veins of other parts of the body.

The cord paſſed at the upper part of the proceſs is to be left entirely looſe, and to ſerve only as a tourniquet for ſecuring the blood veſſels more readily in caſe the ligatures paſſed upon them ſhould accidentally ſlip. There is in fact no more neceſſity for allowing this ligature to remain tied, than there is for leaving a tourniquet firmly applied upon any of the extremities after the operation of amputation; and yet, inſtead of one ligature of this kind, it has been the practice with many, to apply two, about half an inch diſtant from one another, by way of very great ſecurity; and theſe they leave firmly tied upon the whole ſubſtance of the cord during the cure of the ſore.*

There is, however, no kind of neceſſity for this precaution, as all manner of riſk may be entirely prevented by ſecuring the blood veſſels in the manner we have here directed. I have often done the operation in this way, and I never ſaw any inconvenience produced by it. By leaving the ligature at the upper part of the wound untied, it may be made uſe of to compreſs the cord in the event of the blood veſſels burſting out again: But when the operation it properly done, this is an occurrence that will be very ſeldom met with; and at any rate, when it does unfortunately happen, it may be always prevented from producing much miſchief by the ligature left for that purpoſe, and which may with ſafety be removed at the ſecond or third dreſſing of the ſore.

In

* Even the late Mr. Sharpe gives theſe directions. *Treatiſe on the Operation of Surgery*, 10th edit. p. 55.

In making the ligature of the blood veſſels at the extremity of the cord, if it is neceſſary to divide the proceſs near to the abdominal muſcles, as there is a poſſibility, of its retracting for a ſmall ſpace ſo as to get it within the ring, the ligature ought to be cut of ſuch a length as to admit of this; a few inches of it, therefore, ſhould be always left hanging over the ſore, ſo that it may be pulled away at a proper time, in the event of any retraction taking place. But we may here obſerve, that this retraction never happens, when the cord has not been too much ſeparated from the ſurrounding parts in endeavouring to introduce the ligature below it. Indeed, no farther ſeparation ſhould be attempted than merely to raiſe the cord ſo far as to get the point of the needle introduced between it and the bone.

In proſecuting the removal of the teſticle, the ſcrotal artery is neceſſarily divided, and it is ſometimes of ſuch a ſize as to diſcharge a great deal of blood; in which caſe it ſhould always, before going farther, be ſecured by a ligature.

The parts being all removed, and the different blood veſſels all ſecured as we have here directed, a quantity of ſoft lint ſhould be gently laid into the bottom of the ſore; and a compreſs of linen being applied over it, the whole ſhould be ſecured either with the T bandage, or with the ſuſpenſory bag uſually employed in affections of the ſcrotum. The patient being now laid to reſt, and an opiate adminiſtered, the ſore ought not to be touched till a free ſuppuration takes place, which will commonly be about the fifth or ſixth day; and then the dreſſings ſhould be removed, and renewed from time to time, once every two days or oftener, according as the quantity of matter renders it neceſſary. Now and then, after this operation, the patient complains of much pain in the ſore, and of tenſion and uneaſineſs in the belly; in which event, warm fomentations ſhould be applied

to

to the abdomen, and the ſore itſelf ſhould be covered with an emollient poultice, to be repeated as often as may be neceſſary.

In deſcribing the manner of performing this operation, we ſuppoſe it to be done in a caſe where the teſticle has not arrived at any great bulk: In ſuch a ſituation there is never any good reaſon for removing any part of the ſcrotum, as has been commonly adviſed; * for if the teguments are not diſeaſed, or rendered very thin by being much overſtretched, they always recover their tone very ſoon, and ſhould not therefore be removed.

But, when the ſkin has become very thin and inflamed, and eſpecially if any of it is actually in a ſtate of ulceration, all ſuch parts of it ought to be removed along with the teſticle. In ſuch circumſtances the beſt method of doing it is this: Inſtead of a longitudinal inciſion along the courſe of the teſticle, the firſt inciſion ought to be carried in a ſtraight line to the under extremity of the ſpermatic cord; from whence two ſemilunar inciſions ought to be continued to the under part of the ſcrotum, and ſhould be made to include all the parts of the ſkin that are in any degree diſeaſed.

In this ſituation the remainder of the operation ought to be exactly the ſame as we have already deſcribed: The ſkin included by the two ſemilunar cuts is not to be diſſected off, but ought to be removed at once with the diſeaſed teſticle.

CHAP.

* Mr. Sharpe in ſuch caſes adviſes a portion of the ſcrotum always to be removed, p. 55. *Loc. cit.*

CHAP. X.

OF THE DISEASES OF THE PENIS.

SECTION I.

Of the PHYMOSIS.

THE glans penis is naturally provided with a covering termed the *præputium*; formed by an elongation and doubling of the skin. This in a healthly state is in general of such dimensions as to pass easily over the glans, but by disease it is frequently prevented from doing so; and when the prepuce has got forward, and cannot be drawn back over the glans, the disease thereby produced is termed a Phymosis.

This complaint is induced by whatever tends to swell the glans, or to excite inflammation and stricture in the preputium; and in some people, the prepuce is so tight, as to render them liable to complaints of this nature from very trifling causes. An exsudation of a whitish, viscid matter between the prepuce and glans is natural to many; and the disease now under consideration, is frequently the consequence of want of cleanliness, by which this matter is allowed to rest till it becomes acrid: But the most frequent cause of it undoubtedly is the application of the venereal virus to these parts, by venereal intercourse with diseased women.

In

In slight affections of this kind, especially when the disorder has not been of long continuance, fomenting the parts frequently in any warm emollient decoction, commonly gives relief; or what answers perhaps better for such purposes than any decoction, is warm milk; this, together with the use of emollient poultices with a view to relax the constricted preputium, will often answer so effectually as to render any other application unnecessary.

At the same time that fomentations and poultices are applying in this manner externally, part of the fomentation ought to be injected from time to time by means of a syringe between the prepuce and glans, in order to wash away any matter, either of concealed chancres, or that may be produced merely by the inflammatory affection of the part.

When the parts are much inflamed, bloodletting often proves serviceable: When the superficial veins of the penis can be opened, any blood to be discharged should be taken from one of them by the lancet; but when they do not appear conspicuous, discharging it from the arm will answer as well as from any other part: Local bloodletting by means of leeches would be here particularly indicated; but when the disorder has originated from a venereal taint, the bites produced by these animals almost constantly terminate in troublesome sores. Together with a discharge of blood proportioned to the strength of the patient, gentle laxatives should be prescribed, a low diet, and abstinence from exercise.

When, however, it is found that even a due perseverance in these means has no influence in removing the disorder, and especially if chancres are confined under the prepuce, which might injure the glans by the matter discharged from them not getting a proper vent, in that case it becomes necessary to remove the stricture by an incision carried along the whole course of the preputium.

As

Plate XI.

Fig 1.

Fig 2

Fig 3

Fig 4

As the skin of the prepuce is exceedingly lax, it is almost impossible to cut it with neatness and accuracy in the ordinary way, either by a scalpel or bistoury; and when done in this manner, the skin yields so much before the instrument, as always to render it a very tedious and painful operation: Neither are the probe scissors well calculated for doing it properly, as the parts are commonly so thick as to be much bruised by the blades of the instrument.

These inconveniences in this operation being exceedingly obvious, many inventions have been proposed for effecting it more easily. In Plate XI, is represented an instrument which I had made for this purpose several years ago, and it answers the intention very effectually and with much ease.

It consists of a director with a small curve at its extremity, to which a sharp pointed bistoury with a very narrow blade, is so exactly adapted, as to have the cutting part of it entirely concealed in the groove of the director, which ought to be about a quarter of an inch longer than the blade of the knife.

The knife being inserted into the director so as to be concealed by it entirely, the instrument in this state is to be insinuated between the prepuce and glans on one side of the penis, till the director is found by the finger to have reached the upper end of the preputium. The operator is now to keep the director firm with one hand, and with the other is to push the knife forward, so as to make its point pass through the prepuce; and the director being withdrawn, the operation is finished by drawing the knife forward so as to make it divide the prepuce through its whole length along the side of the penis.

In this manner the preputium is preserved in a tense state while the division is going on, by which means the operation is very easily accomplished: And by making the division on the side of the penis, the large veins of the part are avoided, which they could

could scarcely be if the operation was done in the back part of it.

The prepuce being thus divided, the parts below ought to be bathed with warm water so as to wash off effectually any acrid matter with which they may be covered; and this being done, the sore should be covered with a bit of soft lint; and a compress of old linen being laid over it, the whole may be very effectually retained by a small linen bag adapted to the size of the penis, to be secured by two straps pinned to a circular bandage made to surround the body. This bag must indeed be always removed when the patient makes water; but this is easily done; and it retains the dressings, not only more effectually, but with more ease to the patient, than is ever done either with adhesive plasters or any other form of bandage.

In the after dressings of the sore, care should be taken to insert a piece of soft lint between the divided prepuce and glans, otherwise troublesome adhesions are apt to occur between them; I have met with several instances of this, which gave much distress to the patients, and which by a little nicety and attention in dressing the sores might very easily have been prevented.

It is scarcely necessary to observe, that when any venereal infection subsists in the constitution, the sore produced by this operation will not readily heal, if the patient be not put under a proper mercurial course. In such circumstances therefore, if mercury has not been previously administered, it ought always to be prescribed immediately on the operation taking place.

In some cases of phymosis, the preputium is found to be so very long, that instead of dividing it longitudinally, the operation of circumcision answers the purpose better; and it is very easily effected, by taking away such a portion as may appear requisite, of the whole circumference of the prepuce. In such circumstances, when the prepuce is naturally too long,

long, the removal of a quarter or half an inch of it often frees the patient from what even before the approach of this disease he had found to be inconvenient; and as the removal of the extremity of the prepuce in general allows the remainder to retract easily, the operation is accordingly now and then performed in this manner.

SECTION II.

Of the PARAPHYMOSIS.

BY the term Paraphymosis is meant a morbid retraction of the preputium, producing stricture behind the glans penis. This disease, like the former, is induced most frequently by a venereal taint: But it will arise from whatever tends to produce, either a preternatural fulness in the glans, or a constriction of the prepuce; and more especially from such causes as affect a complication of both.

In the incipient state of this disorder, by a little attention and dexterity, the prepuce may be sometimes brought over the glans, by the surgeon's pushing the nut gently back with both his thumbs, while his fingers are at the same time employed in moving the prepuce easily forward. In the more advanced state of the disease, however, no attempt of this kind ought to be made, as it is in the commencement of it only that it is ever known to succeed; and when it does not prove useful, it is apt to do harm, by inducing an increased degree of irritation in the parts to which the pressure is applied.

As the paraphymosis seems evidently to be more frequently induced by an enlargement of the glans than by any original affection of the prepuce, so the stricture in the latter is not here so effectually relieved by warm fomentations, as it commonly is in the phymosis, where the disorder is most frequently produced

by an affection of the prepuce itself. In the paraphymosis, indeed, I have often seen much harm done by applications of this kind; as they evidently tend to produce an increase in the swelling of the glans, by which the stricture in the prepuce is always proportionally increased.

Nothing in general answers so well here as the saturnine applications. Such swellings, indeed, will often subside by being frequently immersed in a cold solution of saccharum saturni, when no other remedy has any influence. But, when the penis is evidently much swelled and inflamed, together with this application to the part, the patient ought to be kept cool, gentle laxatives should be prescribed, and discharging blood from one of the superficial veins of the penis is sometimes of use.

By a due continuation of these means, and by keeping the patient on a low diet, this disorder will most frequently be removed: But when, notwithstanding the use of these remedies, the disease proceeds to increase, by the swelling in the glans becoming more considerable, and the stricture of the prepuce increasing, an œdematous swelling begins to appear in the latter, which on some occasions acquires a considerable degree of magnitude; and unless relief be now obtained by a complete removal of the stricture, mortification of the glans itself is very apt to occur.

When, therefore, none of the remedies we have recommended prove effectual in preventing this stage of the disorder, we are now to attempt to remove the stricture by an operation; and the easiest method of performing this, is, with the shoulder of a lancet to make a deep scarification on each side of the penis, directly behind the glans; taking care to make each cut of about half an inch in length, and of such a depth as effectually to divide the prepuce just at its termination.

The

The parts ought now to be allowed to bleed freely, as this circumſtance of itſelf in general affords immediate relief; and as ſoon as the hemorrhagy ſtops, a pledgit of any emollient ointment being applied to the ſores, and a ſoft well made poultice being laid over the whole, if the ſcarifications have been carried entirely through the ſtricture, nothing farther will in general be neceſſary than dreſſing the parts daily with the ſame ointment with which they were at firſt covered: But, if they have not been made of a proper depth, it will be afterwards neceſſary to renew them; when care muſt be taken to do the buſineſs effectually.

In the phymoſis, it was recommended to put the patient under a mercurial courſe whenever there is the leaſt reaſon to ſuſpect that any venereal taint ſubſiſts in the conſtitution; and the ſame precaution, it is evident, muſt be equally proper in caſes of paraphymoſis.

SECTION III.

Of Amputation *of the* Penis, &c.

THE penis, like other parts of the body, is liable to diſorders, which ſometimes renders it neceſſary to remove the parts affected by amputation.

Thus we know, that on ſome occaſions the penis is ſeized with mortification, and it is frequently attacked with ſores of the cancerous kind: And when mortification has been induced, either by a neglected paraphymoſis or by any other cauſe, it becomes neceſſary to remove the diſeaſed parts; as is likewiſe the caſe when any part of the penis is ſeized with a cancerous ſore, which, inſtead of healing by the means regularly employed for its removal, proceeds to turn worſe.

We have elſewhere entered fully into the conſideration both of cancerous diſorder and of mortification.

tion.* To what was then ſaid reſpecting the treatment of theſe affections we muſt now refer, and ſhall at preſent attend only to the operation of amputating the penis whenever it has become ſo diſeaſed as to render this neceſſary.

A circular inciſion ought to be firſt made through the ſound ſkin at the fartheſt extremity of the ſore, and the ſkin ſhould be then drawn back by an aſſiſtant; when the body of the penis ſhould be cut through by one ſtroke of the ſcalpel, care being taken to remove every part that appears to be in any degree diſeaſed.

This being done, ſuch arteries as bleed freely ſhould be carefully ſearched for, and ought by all means to be ſecured by ligature. In general, two, and ſometimes three branches, of an artery will be met with; and they ſhould all be ſecured in this manner. But even after the principal arteries have been tied, a conſiderable oozing of blood uſually occurs from the ſurface of the ſore, which the ſprinkling with ſtarch or gum arabic in fine powder will ſometimes command; but when this does not anſwer, a ſmall ſilver canula being introduced into the urethra, and retained there by a proper bandage, any farther diſcharge of blood may be very eaſily ſtopt by a ſlight compreſſion made with a narrow roller upon the remaining parts. A very ſlight compreſſion anſwers the purpoſe, ſuch a degree of it indeed as has no influence in hurting the parts on which it is made; and as there is no neceſſity for the tube inſerted into the urethra being of a great length, it is eaſily retained during the whole cure without being productive of much inconvenience.

In Plate IX, fig. 4, is repreſented a tube which I have on different occaſions uſed for this purpoſe. *A.* the tube itſelf; *B. B.* two ligatures for connecting it to a bandage paſſed round the patient's body.

Heiſter

* Vide Treatiſe on the Theory and Management of Ulcers, &c.

Heiſter and ſome other authors, being afraid of the hemorrhagy produced by amputation of the penis, adviſe it to be done by means of a ligature. A ligature being applied with ſufficient firmneſs a little above the diſeaſed parts, they are thereby made to fall off in the courſe of ſix or eight days; but whenever a part can be removed by the ſcalpel, it is done with much more eaſe and certainty than by ligature.

Others, again, have ſaid, that there is little or no danger to be apprehended from any diſcharge of blood that can ever occur here; but this I know from experience is far from being the caſe. In the courſe of one ſeaſon, I had occaſion to perform this operation three different times in the Royal Infirmary here; and in the firſt I was perſuaded by a gentlemen who had found it in one caſe to ſucceed, not to ſecure the arteries by ligatures, but to truſt entirely to compreſſion. This was accordingly done; but unfortunately, in the courſe of an hour or two after the operation, ſuch a profuſe hemorrhagy ſupervened as terminated in the patient's death.

In the next that occurred I was reſolved to ſecure every branch of an artery that could be laid hold of. Three different arteries were accordingly tied, and no hemorrhagy enſued. In the third operation two branches of an artery were ſecured; but a plentiful oozing ſtill continuing from the ſore, the ſilver tube abovementioned was introduced into the urethra, and a ſlight compreſſion being made upon it, the hemorrhagy was thereby effectually ſtopt.

When any arteries that appear have been ſecured in the manner directed, the parts ought to be covered with pieces of ſoft lint ſprinkled with ſtarch or gum arabic in powder; and a compreſs of linen, with a hole in it large enough to paſs over the canula in the urethra, being laid over the whole, and the T bandage being employed to retain it, all the dreſſings may in this manner be effectually ſecured. And the after

treatment

treatment of the ſore ſhould be ſimilar to that of wounds in any other part.

In proceeding to this operation it ought to be kept in view, that the prepuce is frequently ſo much enlarged and ulcerated, as to give cauſe to ſuſpect the glans and other parts below to be much diſeaſed, when in reality they are perfectly ſound. I once ſaw an inſtance of this, where the appearances previous to the operation were ſuch as gave no reaſon to doubt of the glans being affected; and the prepuce with part of the penis were accordingly taken off, when it afterwards appeared that the glans might have been ſaved, as the diſeaſe was found to be entirely confined to the prepuce.

In every caſe, therefore, where there is not an abſolute certainty of the glans being affected, all the diſeaſed prepuce ſhould be firſt removed; and the ſtate of the parts below being examined, if they are found to be ſo much affected as to render amputation neceſſary, this can be then done with as much eaſe as if they had been taken off along with the prepuce; and on the contrary, if they are diſcovered to be ſound, both the ſurgeon and patient will have much cauſe to rejoice.

It ſometimes happens, that the frenum of the penis is ſo ſhort as to create a good deal of uneaſineſs to the parts when in a ſtate of erection. But as there is no danger to be dreaded from a diviſion of this ligament, whenever it proves troubleſome it may with great ſafety be cut acroſs; and it is very eaſily done with a pair of probe pointed ſciſſors: After the frenum is fairly divided, a bit of ſoft lint ought to be inſerted between the lips of the wound, otherwiſe the parts newly ſeparated will be apt to reunite immediately.

On ſome occaſions, the urethra in male children is found to be incomplete, by terminating before it reaches the extremity of the yard. Now and then it does ſo without any external opening, and at other times

times it terminates by a ſmall orifice at ſome diſtance from the end of the penis.

When no opening is diſcovered outwardly, if the urine is found to ſtop at any particular part, the introduction of a ſmall trocar from the point of the yard along the courſe that the urethra ought to take, and carrying it forward till it meets with the urine, will always afford immediate relief; and by the uſe of ſmall bougies the ſides of the paſſage may be rendered callous, and a clear opening be thus preſerved, But when any opening is diſcovered, although it ſhould not be properly placed, yet if it affords a temporary paſſage to the urine, it is better to delay the operation till the patient is ſomewhat advanced in life; and on an opening being then made with a trocar in the manner we have mentioned, a piece of flexible catheter may be introduced, not only for preſerving the paſſage free and pervious, but for carrying off the water till a cure is obtained. In the earlier periods of childhood, the ſmallneſs of parts through which it ought to paſs, renders the flexible catheter altogether inadmiſſible.

Independently of theſe affections of the penis which we have been juſt conſidering, fiſtulous openings frequently occur in the urethra, and they are always productive of much diſtreſs. Theſe we ſhall attend to when we come to treat of the Fiſtula in Ano and Perinæo; and the treatment of Stones impacted in the Urethra, will fall to be conſidered under the operation of Lithotomy.

CHAP.

CHAP. XI.

OF THE STONE.

SECTION I.

General Remarks *on* Urinary Calculi.

PARTICLES of ſtone have been known to form in almoſt every cavity of the body, but they are more frequently met with in the organs of urine than in other parts. It is the effects which calculi produce in the urinary paſſages, with the means which have been found the ſafeſt and moſt effectual for removing them, that we are now to conſider.

The blood, as well as the various ſecretions which it affords, are, by experiment, found to contain a conſiderable proportion of earth: When this earthy part of our fluids is in a proper or natural quantity, and when no cauſe occurs to effect a ſeparation of it, it continues to circulate along with the other parts of which theſe fluids are compoſed; and in ſuch a ſtate it is never productive of any inconvenience. A variety of cauſes, however, may concur to produce a depoſition of this earthy matter from the blood and its ſecretions.

1. We know, that every liquid can diſſolve and keep ſuſpended a certain quantity, and no more, of thoſe ſubſtances of which it is the proper menſtruum; and it is likewiſe known, when a greater proportion than

than this is added, that a ſeparation and conſequent depoſition takes place of all the additional quantity. In like manner, we may ſuppoſe, if the lacteal veſſels ever become ſo diſeaſed as to abſorb a greater proportion of earthy matter from the contents of the inteſtines than the quantity of fluids in the circulating ſyſtem can keep ſuſpended, that this ſuperabundance of earth muſt neceſſarily ſeparate from the reſt: And the depoſitions thus produced, are much more likely to occur in the bladder and kidneys, than in other parts, from the urine being known to contain a greater proportion of earth than any of the other ſecretions.

2. Independent of other cauſes which may tend to induce a ſuperabundant quantity of earthy matter in the blood, ſuch articles of diet as contain a large proportion of any kind of earth have been ſuppoſed to be more productive of it than others: But unleſs ſuch quantities of earth as are contained in food, be conveyed in a ſtate of the moſt perfect fluidity, any effect which this may produce on the general maſs of blood cannot probably be of much importance. There is much reaſon, however, to think, that a long continued uſe, either of water, or of wines, abounding with earth in a diſſolved ſtate, has a conſiderable tendency to produce ſuch a ſtate of the blood as we are now deſcribing.

3. People who are much accuſtomed to live upon ſolid food, will be more liable to the effects of a large proportion of earthy matter in the blood, than thoſe who by a free uſe of liquids are in the habit of preſerving a more plentiful and more diluted ſtate of the different ſecretions. And, accordingly, in ſuch patients as are frequently voiding particles of ſand, and even of real calculi, I have known more advantages derived from a continued and plentiful uſe of diluent drinks, than from any other remedy. A liberal uſe of watery fluids may, no doubt, operate to much advantage, by waſhing away particles of ſand and of

ſtone already formed and lodged in ſome of the urinary paſſages; but they ſeem likewiſe to prove ſerviceable, merely by their diluent properties.

4. A ſuperabundance of earthy matter being once produced in the blood, various circumſtances will concur to form depoſitions of it in the different cavities: Of theſe a ſedentary life is, perhaps, one of the moſt remarkable; and hence it is, that ſuch people are found to be moſt liable to calculous complaints, whoſe occupations require the leaſt bodily exertion.

It muſt, indeed, be acknowledged, that ſtone in the bladder is frequently met with among indigent and induſtrious labourers; whoſe neceſſities, at all times, prevent their indulging in indolence. In ſuch inſtances, however, it may be ſuppoſed, that the very coarſe articles of food, with which people in this line of life are chiefly nouriſhed, will tend to impregnate the blood with ſuch a large proportion of earth, as muſt neceſſarily produce effects not to be obviated even by the beneficial influence of a continued and regular courſe of exerciſe.

5. Whatever influence a prediſpoſition in the ſyſtem may have in the formation of calculus and in its ſubſequent increaſe of bulk, the introduction of any ſubſtance that can ſerve as a nucleus, will almoſt certainly produce a ſtone, in whatever cavity it is lodged. Thus, a particle of ſand, of blood, or coagulable lymph, may, in conſequence of ſpaſm or inflammation, be confined in the pelvis of one of the kidneys, or in the cavity of the bladder, and may ſoon acquire ſuch a ſize, from the conſtant addition of earthy matter it is receiving, as to make it impoſſible for the urine to carry it off: And urinary calculi, thus begun to be formed, will acquire, ſooner or later, a conſiderable bulk, according to the quantity of earth with which the urine is impregnated. Thus inſtances have occurred of ſtones becoming very large, in the ſpace of a few months from the firſt obvious ſymptoms

produced

produced by them; while, on other occaſions, they have been known to remain in the bladder for a great many years without arriving at any ſize of importance.

When ſpeaking of nuclei, it is neceſſary to remark, that their effect in the formation of calculi, in the urinary paſſages eſpecially, appears to be ſo great, that it may be doubted whether a ſtone is ever known to form in theſe parts without the intervention of this cauſe; for, however large the quantity of earth contained in urine may be, it would probably all flow off by the urethra, if it was not detained by the accidental introduction or formation of a nucleus.

Nuclei of different kinds, ſuch as hairs, needles, muſket and piſtol bullets, pieces of bougies, and a variety of other articles, have been met with in the centre of urinary calculi; but particles of blood, or of coagulable lymph, are moſt frequently found to produce them.

By the difference of food uſed at different periods of the diſorder; by the ſtone being formed ſlowly or more quickly; and, perhaps, by the intervention of other cauſes which are not always known, and which, when known, cannot be eaſily explained; it commonly happens, that the different lamellæ of which human calculi are compoſed, vary conſiderably both in colour and conſiſtence; a cruſt of a ſoft friable nature being frequently known to cover one of a texture equal in hardneſs to the moſt ſolid marble; while this again is found to ſurround a ſtratum not firmer than a piece of dough.

Whatever may be the immediate cauſe of this difference of conſiſtence in ſtones, and even of different parts of the ſame ſtone, is of little importance in practice: But we know from experience, that the ſymptoms produced by calculi formed of hard compact materials, are in general more ſevere than ſuch as ariſe from thoſe of a ſofter texture; and we likewiſe know

know, that the ſurface of ſtones being ſmooth or ragged, has much more influence than any other circumſtance in the violence of the ſymptoms which they produce: Much variety too, it may be remarked, is met with in human calculi with reſpect to the ſmoothneſs of their ſurfaces; ſome of them being perfectly poliſhed, while others are altogether covered with hard ſharp ſpicula.

The violence of ſymptoms in affections of this nature, is frequently found to be in a great meaſure in proportion to the ſize of ſtones; ſtones of the greateſt bulk being commonly attended with the moſt ſevere pain. This, however, is not univerſally the caſe: For inſtances ſometimes occur of the moſt ſevere ſymptoms being induced by ſtones of no great bulk; whilſt in others, ſtones of conſiderable magnitude have been known to ſubſiſt for a great length of time without being productive of much pain: But in general it is otherwiſe, and the ſymptoms which take place are moſt frequently mild or ſevere according as the ſtone by which they are produced is of a ſmall or large ſize.

When a ſtone in the bladder has acquired ſuch a ſize as prevents it from paſſing off by the urethra, the patient becomes liable to a ſet of ſymptoms which from their commencement are productive of much uneaſineſs; and which, in the event, commonly terminate in the moſt afflicting ſcenes of diſtreſs to which the human frame is liable. One of the firſt ſymptoms in this diſorder, is an uneaſy ſenſation at the extremity of the urethra, which for ſome time is only diſcovered on the patient taking violent and jolting exerciſe, or immediately after voiding urine. This pain by degrees becomes more frequent and more ſevere. The patient has a ſtrong propenſity to paſs urine frequently; and commonly voids it in ſmall quantities, perhaps even drop by drop.

When

When flowing in a full ſtream, it often ſtops ſuddenly; and this it is moſt apt to do when there is a conſiderable quantity of urine collected, and when of courſe the patient's deſire of voiding it is ſtrongeſt. Nor does the preſſure uſually employed on ſuch occaſions anſwer any good purpoſe: For, as the interruption to the flow of urine proceeds from the weight of the ſtone bearing againſt the neck of the bladder and orifice of the urethra, nothing will produce a free return of it but an alteration in the ſite of the ſtone; which will be moſt readily affected by the patient changing the poſture of his body, and particularly by the pelvis being more or leſs elevated.

The urine of calculous patients is ſometimes perfectly clear: But moſt frequently it is thick, and depoſites a mucous ſediment; and on ſome occaſions, when the diſorder is violent, and when the paroxyſms return frequently, it is tinged with blood. When the ſtone is large, a dull uneaſy ſenſation is at all times experienced about the neck of the bladder; and the irritation produced by it frequently induces a very troubleſome teneſmus, or a conſtant deſire to evacuate the contents of the rectum.

All theſe ſymptoms are uniformly aggravated by exerciſe, particularly by riding on horſeback; and from a long continuance of pain, and from that want of reſt which frequent returns of the paroxyſms are ſure to induce, the patient's ſtate of health by degrees becomes much impaired; and unleſs ſome effectual means are now employed for removing the cauſe of the diſorder, it commonly happens that his miſery is only terminated by death.

When all or moſt of the ſymptoms we have enumerated occur in the ſame patient, there can be no great reaſon to doubt of the nature of the diſorder; and we are rendered particularly certain of the exiſtence of calculous, when fragments of ſtone, or perhaps when ſundry ſmall ſtones, continue to be paſſed

ed from time to time along with the urine: But when this laſt circumſtance does not occur, we can never know with certainty whether the attending ſymptoms originate from a ſtone or not; for inſtances frequently happen of all the ſymptoms uſually produced by ſtone in the bladder, ariſing from an ulcer or tumor either in the body of that organ or in its neck, or even from tumors on the contiguous parts which preſs upon the neck of the bladder.

A perſon much accuſtomed to this part of practice, will in general be able to determine from the ſymptoms which occur, whether a ſtone actually exiſts in the bladder or not; but the only certain means we have of judging of this matter is through the intervention of a ſound, or curved probe; different ſizes of which are repreſented in Plate XII. By introducing this inſtrument into the bladder, in the manner we ſhall afterwards direct, if it touches a ſtone, ſuch a ſenſation is thereby communicated to the operator, as renders the nature of the diſeaſe altogether certain; a circumſtance of which we can never be clearly convinced by any other means.

Among other cauſes which concur to prevent any certainty from being obtained on this point, except from the teſt of ſounding, is, that the very ſame ſet of ſymptoms with thoſe produced by a ſtone in the bladder, frequently occur from a ſtone impacted in one of the ureters, or perhaps even in the pelvis of one of the kidneys. A ſtone in the kidney is commonly indeed attended with ſymptoms which do not often proceed from a ſtone in the bladder; particularly with pain in the back, with frequent nauſea, retching, and vomiting: But theſe do not always occur from calculi in theſe parts; and when they do not, the other ſymptoms produced by them are frequently ſo ſimilar to thoſe which originate from a ſtone in the bladder, as to render it impoſſible to judge with certainty

tainty of the true nature of the diſorder by any other means than by ſounding.

SECTION II.

Of SOUNDING *or* SEARCHING *for the* STONE.

IT will be proper, before deſcribing the operation of ſounding, to give an anatomical deſcription of ſuch parts as are concerned in it; and at the ſame time we ſhall exhibit an account of thoſe parts that are moſt immediately affected by the various operations of lithotomy: Theſe are, the kidneys, ureters, urinary bladder, pelvis, veſiculæ ſeminales and their ducts, proſtate gland, urethra, penis, ſome of the muſcles of the penis, and part of the abdominal muſcles.

A minute deſcription of theſe parts would lead to an extenſive diſcuſſion inconſiſtent with the nature of this undertaking; and as ſuch a deſcription is by no means eſſentially neceſſary, we will only endeavour to give ſuch an idea of the ſituation of the parts, as will ſerve to render intelligible what may be ſaid upon any of the operations of which we ſhall afterwards have occaſion to treat.

The kidneys are two glandular bodies lying in the back part of the abdomen, on the upper part of the pſoæ muſcles; the right being ſituated immediately below the great lobe of the liver, and the left under the ſpleen; and they are both, we may remark, almoſt completely covered by the ſlight curvatures of the inferior falſe ribs. They are ſupplied with blood veſſels, termed the Emulgent Arteries and Veins, directly from the trunks of the aorta and vena cava. The uſe of theſe organs is to ſeparate the urine from the blood, which, as ſoon as it is ſecreted, is carried by means of two canals or tubes, one from each kidney, termed the Ureters, directly to the veſica urinaria. The ureters, after leaving the kidneys, proceed obliquely

obliquely downwards behind the ſpermatic veſſels over the os ſacrum; and paſſing in between the bladder and rectum, they are inſerted into the former near to its neck, at a ſmall diſtance from one another; and after piercing the external coat of the bladder, they run obliquely for a ſhort ſpace between it and the more internal covering of that organ before penetrating its cavity: A conſtruction well calculated for preventing a reflux of urine to the kidneys.

The pelvis is a kind of box or baſon, formed by a conjunction of the os ſacrum, os coccyx, and oſſa innominata. The cavity formed by a particular combination of theſe parts, being intended for the protection of the bladder, and ſome other organs, is every where ſurrounded with bone, or with very ſtrong ligaments, except at its upper and inferiour parts, where alone the cavity of the pelvis is acceſſible, being here covered with ſoft parts only. The greateſt part of the cavity of the pelvis is occupied by the bladder; which, when diſtended with urine, fills it almoſt entirely and on many occaſions even aſcends conſiderably above its brim.

The bladder, or receptacle of the urine, is a membranous bag compoſed of different coats, one of which is evidently muſcular, with its fibres running in different directions. The human bladder is of an irregular oblong figure. The ſuperior part of it has commonly been termed its Fundus, or Bottom: The oppoſite extremity lying at the bottom of the pelvis, is termed the Cervix or Neck; and the intermediate ſpace, its Middle or Body. The bladder is every where nearly, though not exactly, of the ſame diameter, except at its fundus, where it is ſomewhat contracted; and again near to its neck, where it dilates conſiderably, extending back towards the coccyx.

The ſuperior part of the bladder is covered with the peritonæum; and it therefore lies, along with the other abdominal viſcera, within the abdominal cavity; but

but the under part of it is not covered with that membrane. The anterior under part of the bladder is connected by cellular ſubſtance to the pubes; laterally, it is fixed by productions of its external covering to the other bones of the pelvis; and poſteriorly, it is in male ſubjects firmly connected with the rectum, from the entrance of that gut into the pelvis, till within a little of its termination in the anus, when the neck of the bladder and commencement of the urethra ſeparate a little from the gut, leaving a ſpace which is occupied with fat and cellular ſubſtance.

In females, the uterus, in an unimpregnated ſtate, lies altogether in the cavity of the pelvis immediately behind the bladder; and the vagina, in which the os tincæ terminates, lies directly behind the urethra, and before or upon the inteſtinum rectum, to which it is firmly attached.

The neck of the bladder terminates in the commencement of a cylindrical membranous canal, the urethra, which comes off at nearly a right angle from the anterior part of it. The urethra, at its commencement, is ſurrounded by the proſtate, a gland of a flat pyramidal ſhape, with its baſe towards the bladder, and its apex pointing to the perinæum; its ſuperior lamella being connected with the pubes, and its inferior part with the anterior and under part of the rectum.

The urethra continues to be entirely membranous for a ſhort ſpace after it leaves the apex of the proſtate gland; and this part of it keeps in cloſe contact with the oſſa pubis, till it paſſes out from below the arch formed by theſe bones, which it does by making a pretty ſharp curve in its progreſs to the perinæum. This curvature in the urethra it is material to be well acquainted with, for in the operation of Sounding a good deal depends upon this circumſtance. A good anatomiſt in general finds the introduction of a ſtaff very eaſily accompliſhed, while thoſe who are not ver-

ſant in the anatomy of the parts concerned, are not only apt to fail entirely in attempts of this kind, but are ſure to put their patients to a great deal of unneceſſary pain.

The commencement of the urethra, which we have juſt deſcribed, is termed the Membranous part of it; which, before it has proceeded an inch from the extremity of the proſtate gland, is ſurrounded by a cellular kind of body termed the Corpus Spongioſum Urethræ, which here forms a kind of protuberance termed the Bulb of the Urethra; and which afterwards proceeds along in a more diffuſed ſtate to the extremity of the penis, where, by expanding again, it terminates in the formation of the glans penis.

The reſt of the penis is formed of the preputium, which, as we have elſewhere ſaid,* is merely a doubling of the ſkin, and of two round cavernous bodies, termed the Corpora Cavernoſa Penis, which originate by two crura or legs from part of the os iſchium and poſterior part of the pubes on each ſide; and having united near the ſymphyſis pubis, they thus form the principal part of the body of the penis, and are continued to the glans, with which they are connected, but with which the cellular or cavernous parts of theſe bodies have no direct communication.

By the junction of the two cavernous parts of the penis, which are nearly round, a kind of hollow is formed both above and below. In the former of theſe, or in that vacuity which runs along the back part of the penis, the principal veins of the penis run; and the urethra is protected by the latter. The obvious uſe of the urethra is to ſerve as a paſſage for the urine and ſemen; the receptacle of the former we have already deſcribed, and we ſhall now mention thoſe of the latter. The ſemen, after being ſecreted by the teſtes, is, by two very ſmall tubes termed Vaſa Deferentia, lodged in the veſiculæ ſeminales, which are

* Chap. X, Section I.

are found to be two cellular kind of canals, contorted in such a manner as when distended to resemble the intestines of a small fowl. They are seated on the posterior part of the neck of the bladder, below the entrance of the ureters, and lie in close contact with the rectum; and the semen is again discharged from these receptacles by two excretary ducts, which terminate in two points, at a part which, from its figure, has been termed the Caput Gallinaginis, situated in the inferior side of the urethra, nearly about the middle of the prostate gland; and a little below the entrance of these canals from the vesiculæ seminales, the two excretory ducts of the prostate gland empty themselves into the urethra.

The muscles we have to mention here, as being liable to be injured by the operation of lithotomy, are the erectores penis, acceleratores urinæ, transversales perinæi, and levator ani. The erector penis arises from the tuberosity of the ischium; and after covering almost completely the crus penis of the same side, it is inserted by a tendinous expansion into the superior part of the penis, near to where it joins with its fellow of the opposite side.

The accelerator urinæ arises by fleshy fibres from the sphincter ani and contiguous soft parts; and after covering the membranous part of the urethra it is inserted into the middle of the bulb, where it joins with a similar muscle of the opposite side: Part of these muscles, too, run along the crura penis, and are afterwards lost in the ligamentous covering of the corpora cavernosa. The transversales perinæi, are two thin narrow muscles which originate from the firm membranous covering of the tuberosity of the ischium, and, after stretching directly inwards, are inserted into the bulb of the urethra.

Besides these muscles, which all suffer more or less in the lateral operation of lithotomy, a few fibres of the levator ani are necessarily cut in the same operation;

tion; and in the high operation for the ſtone, part of the muſculus tranſverſalis abdominis, of the rectus, and pyramidalis, are alſo cut.

Almoſt all the parts we have deſcribed are furniſhed with blood by branches from the internal iliac artery; and thoſe veſſels which run moſt hazard of being cut in the lateral operation for the ſtone, are, the arteria pudica interna, and the pudica externa: For the former ſupplies not only the parts about the anus, but the bulb of the urethra and the corpora cavernoſa; and the latter, viz. the pudica externa, ſupplies a great part of the bladder, the proſtate gland, and veſiculæ ſeminales.

Having thus premiſed all that is neceſſary for our purpoſe, of the anatomy of theſe parts, we ſhall now proceed to the operation of ſounding.

For the purpoſe of diſcharging water collected in the bladder, a curved ſilver tube is made uſe of, named a catheter; different forms of which are delineated in Plates XIV and XV: But for detecting a ſtone in the bladder, a ſolid inſtrument made of ſteel is preferable, as the ſenſation communicated through the intervention of a firm ſubſtance is much more diſtinct than when an inſtrument of ſilver or of any other ſofter materials is employed. In females, the urethra runs almoſt in a ſtraight line; ſo that an inſtrument either altogether ſtraight or nearly ſo, is more eaſily introduced than one with a large curvature: But in male ſubjects, the turn made by the urethra, when it paſſes up between the rectum and pubes, is ſo conſiderable as to preclude entirely the introduction of a ſtraight inſtrument, unleſs much violence is uſed. By preſerving the penis at an acute angle with the body, the courſe of the urethra may indeed be rendered ſo ſtraight, that a ſtraight probe may be eaſily introduced till it reaches this turn towards the farther extremity of the perinæum; but the curvature made by the urethra at this place, ren-

ders

Plate XII.

ders it neceſſary to employ an inſtrument with a correſponding degree of convexity.

The curvatures commonly given to theſe inſtruments are either too great, or not conſiderable enough. Either extreme renders it difficult to obtain a paſſage into the bladder: For when the ſtaff is made with more convexity than is neceſſary, beſides being more difficult to introduce, it gives a great deal of unneceſſary pain, by ſtretching the urethra very conſiderably; nor can ſuch an inſtrument, with a large convexity, be ſo eaſily managed, when in the bladder, as when the curvature given to it is leſs. In Plate I, ſounds of various ſizes are repreſented, and of ſuch degrees of curvature as by experience have been found to anſwer better than any other. They are taken exactly from the natural curvature of the urethra, the inſtruments from whence theſe are delineated having been exactly adapted to that paſſage, after the ſurrounding parts were diſſected off.

The patient to be ſounded ſhould be laid upon a bed, with his thighs ſomewhat elevated, and ſeparated from one another; and the ſurgeon being placed upon his left ſide, ought to take a ſound of a ſize proportioned to the paſſage intended to receive it: Having previouſly brought it to the heat of the patient's body by immerſion in warm water, and having rubbed it over with fine oil, he is now to graſp the penis with his left hand; and, having introduced the point of the ſound into the urethra, with its concave ſide towards the abdomen of the patient, he muſt puſh it eaſily forwards with his right hand, while at the ſame time he continues with his left hand to draw the penis gently forward upon the inſtrument.

The ſound being in this manner carried a ſufficient length, it will commonly ſlip eaſily into the bladder; but, occaſionally, ſome difficulty is experienced in paſſing it through that part of the urethra where it is ſurrounded by the proſtate gland, the inſtrument

ment being apt to ſtop when it comes to this part of the paſſage; and whenever it does ſo, practitioners ought to be extremely cautious in the force they employ for carrying it on. That part of the urethra, immediately anterior to the proſtate gland, being entirely membranous and unſupported, if the ſound at this part meets with any obſtruction, and if it is ſtill continued to be puſhed forward with any conſiderable force, much miſchief will for certain be produced, by the point of the inſtrument being forced entirely through the urethra; by which, inſtead of getting into the bladder, it will form an artificial paſſage, either between the bladder and pubes, or between the bladder and rectum: An occurrence which is ſure to be productive of much diſtreſs; and which, there is reaſon to fear, is, either from ignorance or inattention in practitioners, much more frequent than it ought to be.

In order to guard againſt the very dreadful conſequences of ſuch an occurrence, as ſoon as any obſtruction is diſcovered to the paſſage of the inſtrument, the fore finger of the left hand, after being well oiled, ought to be introduced into the rectum, which by elevating the point of the ſtaff, while at the ſame time it is puſhed gently forward, will commonly procure its ready entrance to the bladder when no other means have any effect. By depreſſing the handle of the ſound we may alſo elevate the point of it, and in this manner its entrance into the bladder may be ſometimes effected; but in general the introduction of the finger into the rectum anſwers this purpoſe with much more certainty.

This paſſage of the ſtaff into the bladder, it may be obſerved, is a very nice operation; and a dexterity in performing it can be acquired by no other means than by a great deal of practice. Every ſtudent, therefore, ought to embrace all opportunities that occur of practiſing it, firſt on the dead ſubject,

and

and afterwards on the living. For every candid practitioner muſt acknowledge, that he has, on different occaſions, found the introduction of a catheter, or of a ſound, to be a matter of much difficulty. But when the parts concerned are not materially affected with inflammation, ſwelling, or ulceration, the operation does not frequently miſgive in the hands of an expert ſurgeon.

The ſtaff being thus introduced into the bladder, the operator muſt now take hold of the handle of the inſtrument with one hand; and if any part of it falls immediately upon the ſtone, the buſineſs of ſounding is at once accompliſhed, as a certainty is thus obtained of the nature of the diſeaſe: But if the ſtone is not ſoon diſcovered, it may commonly be found by moving the inſtrument ſo as to make its point paſs eaſily from one ſide of the bladder to the other. When the ſtone, however, is ſmall, and has fallen into that part of the bladder which lies below the entrance of the urethra, the ſtaff is very apt to paſs over it entirely. With a view to obviate this difficulty, the finger of the left hand may be again introduced into the rectum, ſo as to elevate that part of the bladder in which the ſtone moſt probably lies concealed. If, again, even this attempt ſhould be found to fail, the patient's body ſhould be put into a different poſture; and no ſituation will, in general, anſwer ſo effectually as lowering the head and upper part of the body, while at the ſame time the pelvis is conſiderably raiſed. By this means a ſtone, if it be not contained in a particular cyſt, which it rarely is, may be moved from the projection at the neck of the bladder towards its fundus, where it will be more readily ſtruck with the ſound. But when even by this poſture of the body we fail in obtaining a certainty with reſpect to the exiſtence of a ſtone, every variety of poſition ought to be tried: The patient's head may be elevated, and the pelvis depreſſed; he may be made to ſtand erect; or,

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what I have sometimes known to succeed after other attempts had failed, he may be made to stand upon his feet, with his body as much bended forward as possible.

It sometimes, however, happens, when the stone is very small, and the capacity of the bladder is large, that our first attempt in sounding fails altogether; but when the symptoms of stone are strongly marked, and when scirrhosity and ulceration of the parts which might give rise to these symptoms are not found to exist, we ought not to rest satisfied with one or even with two trials. I have known a stone discovered on the third or fourth sounding, which had escaped the instrument in all the preceding trials.

When a stone is struck by the staff, the sensation it communicates to the operator is of such a particular nature, as to render it impossible for any person versant in matters of this kind to be deceived by it if he attends sufficiently to the business he is about: But, to those not much accustomed to this part of practice, a hardened state of the bladder itself communicates such a sensation through the staff, as frequently proves the cause of most unfortunate deceptions. Occurrences of this kind have even happened to practitioners of much experience: It is reported of the most celebrated lithotomist of this, or perhaps any other country, that in the course of his practice, which indeed was very extensive, three patients were cut by him in whom no stones were discovered, and where a scirrhous, or hardened state of the bladder, had given rise to the mistake.* With practitioners of experience, however, this can never happen but from gross inattention; for I will venture to affirm, that a person who is once accustomed to know the nature of that sensation communicated by a stone, can never, if he attends properly to what he is doing, be deceived by the

* The late Mr. Cheselden.

the application of the ſound to a ſcirrhus or any other tumor.

There being the leaſt hazard, however, of ſuch a misfortune occurring as the one we have mentioned, namely, that of a patient being made to undergo all the pain and riſk attending the operation of lithotomy, when no ſtone has exiſted, is a matter of ſuch a ſerious nature, as ought to render every practitioner exceedingly attentive to this part of the operation.

SECTION III.

General Remarks *on the* Operation *of* Lithotomy.

THE preſence of a ſtone in the bladder being aſcertained in the manner we have mentioned, the means to be employed for the patient's relief is the next object of conſideration.

At a certain period, the publick were much amuſed with high encomiums on the lithontriptic powers of different articles, particularly of lime water, and of cauſtic alkali in a diluted ſtate. But although ſome human calculi are ſoluble in either of theſe liquids, particularly in the latter when directly immerſed in it, yet neither of them can be conveyed in ſuch a ſtate to the bladder as to be much depended on. Many patients, indeed, have experienced ſome relief from the uſe of theſe remedies: The pain has, by their means, been rendered ſomewhat leſs ſevere, and the paroxyſms have apparently been rendered leſs frequent; but we have not one authenticated inſtance of a ſtone in the bladder being diſſolved by the uſe of theſe, or of any remedy whatever.

As the conſtituent principles of theſe and other lithontriptic medicines, render them liable to very material changes in their paſſage through the circulation from the ſtomach to the bladder, it has been propoſ-

ed to convey remedies of this claſs directly into the bladder itſelf, in order to bring them into immediate contact with the ſtone; and machines have, accordingly, been invented for injecting with facility ſuch medicines of this kind as are ſuppoſed to prove moſt effectual: But, after a great many trials have been made of remedies of this nature, it ſeems now to be univerſally allowed among practitioners, that no ſolvent, powerful enough to have any effect upon a ſtone can be injected into the bladder, but with the greateſt hazard of injuring that organ in a very material manner. But as ſome practitioners ſtill continue to think favorably of this practice, we have given a delineation, in Plate XX, of a machine by which liquids may with great eaſe be injected into the bladder. Every attempt, however, of this kind is now in general laid aſide; and as no dependence is to be placed upon the lithontriptic powers of any medicine taken by the mouth, the only reſource we have, is, the removal of the ſtone by a chirurgical operation. By this means, if the patient's conſtitution is not much impaired, he may again enjoy as good health as he did previous to the appearance of the diſorder. And unleſs the operation be ſubmitted to, it is almoſt certain that the remainder of a miſerable life will be cut ſhort by the frequent returns of pain and fever to which people in this ſituation are conſtantly liable.

It is to be remembered, however, that although a great proportion of thoſe who are cut for the ſtone recover and do well, yet a conſiderable degree of danger always attends the operation; ſo that, before adviſing any perſon to ſubmit to it, ſuch circumſtances ought to be conſidered with attention as can beſt enable us to form a juſt prognoſis of the event.

By experience it it found, that children more readily recover from this operation than adults; and it is likewiſe obſerved, that old people, from the fifty fifth to the ſeventieth year, whoſe conſtitutions have not

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been much broke, run less risk from it than men in the full vigour of life. This difference may possibly arise from the inflammatory symptoms, which usually succeed to this operation, being more apt to proceed to a dangerous length in young plethoric people than in older patients; and we know from experience, that more danger is to be dreaded from the effects of inflammation after this operation, than from any other cause. But at whatever period of life the patient may be, if he is otherwise in good health, more success is to be expected from the operation, than if his constitution had been previously impaired by frequent returns of the disorder; and this especially if the disease should have continued so long as to produce ulceration in any part of the bladder.

In such a diseased state of the bladder as ulceration commonly induces, if the patient is far advanced in years, he could not expect much enjoyment of life, even although he should recover from the operation: In these circumstances, therefore, a prudent practitioner would rather decline to operate; and instead of this, he would advise a plentiful use of mucilaginous drinks; the use of the warm bath; together with doses of opiates proportioned to the degree of pain. By these means the violence of the disorder is sometimes mitigated, and the patient is thereby saved from the distress of a severe operation, the effects of which, in a constitution such as we have mentioned, are frequently found to prove fatal.

But, even in these circumstances, if the patient is at an early period of life; if he is suffering much from the disorder; and if he is not so weak as to render it probable that the quantity of blood usually lost in the operation may prove destructive to him; I would be clear and decided in advising the operation. His chance of recovery will, undoubtedly, be less than if his health had been otherwise unimpaired; but, if he

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is lucky enough to ſurvive the operation, he may enjoy life with comfort and eaſe.

When it is once determined to have recourſe to the operation of extracting the ſtone, the next point of importance is the beſt method of effecting it. From the anatomical deſcription we have given of the parts with which the human bladder is ſurrounded, it is evident, that there are only two parts of it which can with any propriety be laid open for this purpoſe. A conſiderable part of the fundus of the bladder we have ſhown to be covered with the peritonæum; ſo that to open it here would be attended with imminent danger, from the certainty of expoſing the abdominal viſcera, not only to the effects of the external atmoſphere, but to the irritation of the urine evacuated into the cavity of the peritonæum from the wound in the bladder. The poſterior part of the bladder we have ſhown to be either immediately covered with bone, or internally connected with parts which it would be highly improper to injure; and theſe particularly are, the rectum, the veſiculæ ſeminales, with the vaſa deferentia and ureters.

The only parts of the bladder, therefore, which we can with propriety cut into, are, that portion of the anterior part of it, which lies immediately below the peritonæum, and which, when in a ſtate of diſtention, is raiſed ſomewhat above the pubes; where an inciſion directly above the brim of the pelvis will lay that part of it bare where it is not covered by the peritonæum, and where accordingly an opening into it is commonly practicable: And, again, that portion of the bladder we have termed its neck, which may be opened laterally by an inciſion in the perinæum, without any danger of wounding other parts of importance.

It is in one or other of theſe parts that any opening into the bladder can be made with ſafety. Some practitioners, indeed, have attempted to cut into it at the poſterior part of its neck, or even into the body

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of it at once; but the hazard of wounding parts of much importance is here so great, that for this and other reasons which we shall afterwards mention, every operation of this kind is now laid aside. We shall presently, however, enter more fully into the discussion of this point, by giving a detail of the various means which have been proposed from the time of Celsus downwards, for the purpose of extracting stones from the bladder; and this we shall do in the order of time these different operations were introduced into practice.

The distress and misery occasioned by urinary calculi were probably experienced in the early ages of the world. Relief, we may therefore suppose, would be sought for by the removal of the stones, as soon as such a sufficient knowledge of anatomy was obtained as could render attempts of this kind practicable. Accordingly we find, from the writings of Hippocrates, that, even at this early period, the operation for the stone was frequently performed; but as this branch of business was then solely practised by a particular set of men termed Lithotomists, no account is transmitted to us by this author of their method of performing it. Celsus is the first who describes the method of operating at the time when he lived; and it consisted in an opening being made in the body of the bladder, directly upon the stone itself. From the small number of instruments used in this method of cutting, it has been termed the operation by the Lesser Apparatus.

SECTION IV.

Of the Operation *of* Lithotomy *by the* Lesser Apparatus.

THE person to be cut being properly secured, the easiest and best method of effecting which we shall

ſhall deſcribe when ſpeaking of the lateral operation, the ſurgeon is then to dip the fore and middle fingers of his left hand in oil; and having introduced them into the anus of the patient, he is to ſearch for the ſtone, and to puſh it forward towards the perinæum, directly below the pubes. In order to facilitate this part of the operation ſo as to get the ſtone properly fixed, the ſurgeon ought to preſs with his right hand upon the under part of the abdomen, at the ſame time that he is puſhing the ſtone forward by his fingers in the rectum. By this means the ſtone is to be preſſed forward below the pubes, and is to be ſecured upon one ſide of the perinæum, between theſe bones and the anus. This being done, we are directed by Celſus to make a ſemilunar cut through the ſkin, cellular ſubſtance, and muſcles; beginning on one ſide of the anus, and carrying the cut directly over the centre of the tumor formed by the projection of the ſtone. The bladder being thus laid bare, a tranſverſe inciſion is ordered to be made through the coats of it directly upon the ſtone; when the ſtone, if it is a ſmall one, may probably be turned out by the fingers in the rectum preſſing upon it from behind; but if it is large, and if it does not come away eaſily, we are deſired by Celſus to take the aſſiſtance of a hook for ſcooping it out.

This operation, with a few variations, continued, ſo far as we know, to be the only method of cutting for the ſtone, till the beginning of the fifteenth century, when another method of operating was introduced, which we ſhall afterwards relate particularly. Long after this period, however, this operation of Celſus was ſtill continued by many regular practitioners; and the eaſe with which it is accompliſhed, not only from the ſmall number of inſtruments neceſſary for doing it, but from little or no anatomical knowledge being abſolutely requiſite, preſerved it in conſtant uſe with Itinerants, who continued, even to a very

very late period, to practiſe it in different parts of Europe, under the name of the operation upon the Gripe.

This method of cutting for the ſtone is indeed ſo eaſily effected, particularly in young ſubjects, that, even in theſe times, many of our well informed practitioners have a ſtrong partiality towards it. At ſo late a period as the time of Heiſter we find it was much in repute, that practitioner himſelf having been in the habit of performing it frequently. But ſurgeons in general have been much deceived with reſpect to the parts injured by this operation: For it has been commonly ſuppoſed, that by cutting directly upon the ſtone, the bladder itſelf muſt alone be wounded, while all the neighbouring parts of importance are imagined to eſcape unhurt; a circumſtance which would undoubtedly prove a ſtrong recommendation of it, if on experience this was found to be the caſe: This, however, is far from being ſo, as any perſon who will make the experiment will readily perceive.

A ſtrict attention to the anatomy of the parts might at once indeed convince us of the difficulty, if not of the abſolute impoſſibility, of cutting from the perinæum directly upon a ſtone of the bladder, without deſtroying either the vaſa deferentia, the veſiculæ ſeminales, or the excretory ducts of thoſe receptacles; the deſtruction of any of which would accompliſh the effects of caſtration with as much certainty as a total extirpation of the teſtes themſelves. Theſe parts we have ſhown to be all placed upon the under and back part of the bladder; and as they, as well as the ureters, are immediately connected with that part of it which is cut in this operation, it is perhaps impoſſible to perform it without dividing one or other of them.

As I had once a favorable opinion of this operation, I thought that on many occaſions it might be uſefully employed, if on experience it ſhould be found that theſe parts could be avoided by the ſcalpel. I accordingly put it frequently in practice on dead ſubjects; but

but although in all of them it was done with every poſſible attention, it was conſtantly found either that the veſiculæ ſeminales were divided, or that their excretory ducts were cut acroſs. This, however, was not all; for although in ſome inſtances the urethra was not touched, yet in others it was found to be completely laid open before the ſcalpel reached the bladder. In every inſtance where the operation is performed in the manner directed by Celſus, this circumſtance of injuring the urethra before opening the bladder, is what muſt unavoidably happen: For it is altogether impracticable to make a tranſverſe inciſion here into the bladder, as is adviſed by that author, without previouſly paſſing through part of the urethra; that canal at its farther extremity being always puſhed forward by the fingers in the rectum, in ſuch a manner as to render it impoſſible to avoid it in this method of performing the operation.

But in moſt of the trials of this kind which I had occaſion to make upon dead ſubjects, I attempted what I ſhould conſider as a very material improvement of Celſus's method. A tranſverſe or ſemilunar inciſion through the teguments and muſcles I believe to be better adapted than any other for giving a free paſſage to the ſtone; but as the bladder is compoſed of a very dilatable membranous ſubſtance, there is no neceſſity for a tranſverſe inciſion being made into it. After laying the bladder bare, therefore, by a ſemicircular cut along the courſe of the ſtone, inſtead of continuing the ſame kind of inciſion with which the operation commenced, a longitudinal wound was made directly on the centre of the ſtone, in order to avoid with as much certainty as poſſible all thoſe parts which ought not to be injured. Even with this precaution, however, although the urethra was avoided, ſome of the other parts we have mentioned were always found to be divided; ſo that although they may by accident, perhaps, be avoided once in a great

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number of inſtances, I am confident that even the moſt expert anatomiſt would very ſeldom be able to make an opening into this part of the bladder ſufficient for extracting a ſtone even of a very moderate ſize, without dividing either the veſiculæ ſeminales, the vaſa deferentia, or their excretory ducts. In ſome inſtances, too, the entrance of the ureters into the bladder is ſo low down as to render them liable to be injured by this operation: This, however, is a rare occurrence; but it has on ſome occaſions been known to happen.

Another very material objection to this operation is, that the bladder when cut, being puſhed forward and divided at a part which muſt afterwards recede from the external wound in the teguments, conſiderable riſk muſt be thereby incurred of ſinuſes forming, by the urine inſinuating itſelf into the neighbouring parts; and we have to add to all this, that in general this operation muſt be confined to the early periods of infancy. The readings of Celſus with which we are furniſhed, limits the performance of this operation to the age of ten, or from that to the fourteenth year; but this muſt ſurely be conſidered as an error in the late editions of that work, as the operation of which we are now ſpeaking is unqueſtionably better calculated for the earlieſt periods of infancy than for the more advanced ſtages of it, inſomuch that it is always practicable with more or leſs eaſe, in proportion to the thickneſs of parts about the rectum and bladder; and this, again, we know depends in a great meaſure upon the age of the patient. We are told, indeed, of ſome practitioners who performed this operation on people of every age, of every habit of body, and whether corpulent or not: Such accounts, however, have never been well authenticated.

Among other improvements of this operation of Celſus, the uſe of the forceps for extracting the ſtone was none of the moſt inconſiderable; but neither this, nor any other advantage it can receive, is capable of

obviating the difficulties we have mentioned. We find accordingly, that, about the beginning of the 16th century, ſome time between the year 1500 and 1520, a new method of operating for the ſtone was propoſed at Rome, by Johannes de Romanis, as we are afterwards informed by one of his pupils, Marianus, and whoſe name has been commonly given to it; this being termed the Methodus Mariana, or Lithotomy by the Greater Apparatus, from the great number of inſtruments which on its firſt introduction were employed in it.

SECTION V.

Of LITHOTOMY *by the* GREATER APPARATUS.

BY this operation a paſſage is made into the bladder, by cutting into the urethra immediately at the bulb; and at this opening a variety of inſtruments were by ancient writers propoſed to be introduced, for the purpoſe of dilating the paſſage to ſuch a ſize as might eaſily admit of the extraction of the ſtone.

From the period at which this operation was introduced, a number of inventions were propoſed at different times, for the ſole purpoſe of rendering the dilatation of the urethra and adjacent parts more eaſy. Theſe it is unneceſſary to enumerate, as an account of the operation as it was laſt practiſed in its moſt improved ſtate, will ſerve to communicate all that is neceſſary to be known concerning it.

The patient being properly ſecured, and placed upon a table in the manner we ſhall deſcribe more particularly when treating of the lateral operation, a grooved ſtaff was then introduced through the urethra into the bladder; the handle of the inſtrument being carried over the right groin, while its convex part was made to puſh out the urethra on the left ſide of the perinæum. In this poſition the ſtaff was preſerved by

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an assistant, who likewise suspended the scrotum; while the operator, with a scalpel in his right hand, made an incision from the very bottom of the scrotum to within a finger's breadth of the anus, carrying it all along the left side of the perinæum, within a very little of the rapha.

The skin, cellular substance, and muscles, being thus divided, the urethra itself was now opened at its bulb, by turning the back part of the knife towards the rectum, and cutting with the edge of it directly into the groove of the staff; and the incision was then completed by carrying it along to the extremity of the urethra, at the commencement of the prostate gland.

Various instruments were at one period in use, termed Dilators, Male and Female Conductors, &c. &c. for the purpose of finishing the operation, by dilating such parts as we have not here directed to be cut; and the timidity of some operators was even so great as to cause them to dilate almost all that part of the urethra which lies between the bulb and the prostate gland: A degree of caution by no means necessary, and which, by the violence done to the parts, was sure to be productive of many disagreeable consequences. Other practitioners, however, performing the operation so far in the manner we have mentioned, finished the remainder of it, first, by introducing a blunt gorget into the bladder by running its beak along the groove of the staff, and afterwards pushing it forward so as to force a passage through the prostate gland; and this being accomplished, the fore finger of the left hand was introduced along the gorget, and with it the passage was farther dilated, till the operator thought the opening was sufficiently large for the stone to pass through it.

The opening being in this manner finished, the stone was extracted in the manner we shall afterwards direct when treating of the lateral operation, by the use of different forceps adapted to the size of the parts:

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And in the extraction of the ſtone, all thoſe parts which were not cut in the previous ſteps of the operation, were of neceſſity very much lacerated.

Although this operation was long practiſed, it is liable to many objections. The number of inſtruments uſed in it is mentioned as one of theſe: But in the improved ſtate of the operation we have deſcribed, this objection is entirely removed, no more inſtruments being uſed in it than are neceſſary in the moſt ſimple method of performing the lateral operation; namely, a ſcalpel, gorget, and forceps for extracting the ſtone. But the material objections to which it is liable, are, that by beginning the inciſion ſo near to the ſcrotum, much more of the urethra is cut than is neceſſary: By not dividing the proſtate gland with a cutting inſtrument, ſuch laceration is produced, firſt by the forcible introduction of the blunt gorget, and then by the extraction of the ſtone, as muſt be the cauſe of much irreparable miſchief: And laſtly, by the parts not being ſo freely divided as they ought to be, it muſt frequently be impoſſible to extract large ſtones by this operation, which, in the lateral method as it is now practiſed, would paſs with tolerable eaſe. In other reſpects, however, this operation was poſſeſſed of much merit, and it required only to be improved in a few circumſtances to become the real lateral operation of modern practitioners. Theſe, however, it is unneceſſary to dwell longer upon at preſent, as they will be afterwards particularly taken notice of when we come to treat of that operation.

After this operation had been practiſed for thirty or forty years, ſome of the inconveniences attending it ſuggeſted the idea of what was afterwards termed the High Operation; an appellation it received from the bladder in it being cut into above the oſſa pubis.

About the year 1561, Franco, a French ſurgeon of this name, publiſhed a treatiſe on herniæ*; and here

* Traité tres ample des Hernies, par Pierre Franco.

here we find the firſt account of the high operation that is to be met with in books. It was accident which ſuggeſted it to Franco; for having, as he informs us, met with a large ſtone in a child of two years of age, which he could not poſſibly extract by the operation as then practiſed in the perinæum, he was induced to open the bladder above the pubes: But although the ſtone was extracted and the child recovered, Franco never performed the operation again himſelf; and he even adviſes it never to be attempted by others, from the great danger which he thinks will attend it.

The next account which we find given of it is by Roſſet, in a publication on this and ſome other ſubjects, publiſhed at Paris in the year 1590. But it does not appear that he ever performed the operation himſelf; nor was it any where much practiſed till ſome time after the commencement of the preſent century, when it was adopted and keenly patronized at London by Mr. Cheſelden and Mr. Douglas.

During the twelve or fifteen years immediately ſubſequent to the year 1720, the high operation was frequently performed both in London, Edinburgh, and other parts of Europe: But the lateral operation, with the improvements upon it by Rau, being then more generally known, the ſuperior advantages it was found to poſſeſs very quickly procured it a preference; and ſince this period the high operation has never been generally practiſed, either in this or in any other country. But we ſhall now proceed to deſcribe the method of performing it.

SECTION VI.

Of the High Operation *for the* Stone.

WE have already ſhown, that the bladder, at its fundus, or that part of it which lies higheſt in the pelvis,

vis, is covered with the peritonæum ; ſo that at this part no opening, it is evident, can be made into i with ſafety, as the operator would not only run the riſk of wounding the inteſtines, but the urine would be apt to eſcape into the cavity of the abdomen. It is the anterior part of the bladder, viz. that ſpace lying between the middle of this viſcus and its neck, which ought to be opened in this operation : But this part of the bladder is ſeldom ſufficiently elevated for this purpoſe, unleſs when it is conſiderably diſtended ; and as one common effect of the ſtone in the bladder is to produce a diminiſhed contracted ſtate of it, this circumſtance of itſelf is not an unfrequent objection to this operation ; for unleſs the bladder is capable of containing a conſiderable quantity, at leaſt a pound and a half in an adult, it ought ſeldom, if ever, to be attempted.

Various methods have been contrived for the purpoſe of diſtending the bladder. It has been propoſed to effect it by means of air thrown into it from a pair of bellows ; and others have recommended a quantity of water to be injected into it immediately before the operation, and to retain it there by making a ligature upon the penis. Both of theſe methods, however, will incur ſome riſk of hurting the bladder by too ſudden diſtention ; and we are even told by ſome writers, that the bladder has been burſt by attempts of this kind. Means, therefore, of a more harmleſs nature ſhould be attempted ; and it may be done, I think, without running any riſk of injuring the bladder, merely by deſiring the patient to accuſtom himſelf, for a conſiderable time before the operation, to retain his urine as long as poſſible ; and as ſoon as it is found that he can retain the quantity that is thought neceſſary, viz. a pound and an half in an adult, and ſo in proportion according to the age, by paſſing a ligature upon the penis ten or twelve hours before the operation, and ordering him to drink plentifully of

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any diluent drink, we may be almoſt certain of producing a ſufficient degree of diſtention.

This being done, the patient muſt be laid upon a firm table about three feet four inches in height; at the ſame time that his legs and arms muſt be properly ſecured, not by ligatures, but by the hands of aſſiſtants. In order to guard as much as poſſible againſt any injury being done to the bowels, the patient ought to be laid with his head conſiderably lower than his body, and his thighs and buttocks a good deal elevated. By this ſituation, too, the ſtone, which would otherwiſe fall into the neck of the bladder, where it could not be very acceſſible, will be brought more contiguous to the intended opening, and will hence be more eaſily laid hold of, either by a pair of forceps or by the fingers.

The patient being thus properly ſecured, an inciſion is to be made with a roundedged ſcalpel, directly upon one ſide of the linea alba, beginning about four inches above the oſſa pubis, and continuing it down to the ſymphyſis of theſe bones: Even the linea alba itſelf may be divided with perfect ſafety; but it is better to avoid it, as the inciſion is much more eaſily made in ſoft parts than in tendinous ligamentous ſubſtances. The ſkin and cellular ſubſtance being freely divided, the recti and pyramidales muſcles come ſucceſſively into view: In general, the inciſion may be carried on merely by ſeparating theſe muſcles from one another; but no detriment could enſue from ſome of their fibres being cut by the ſcalpel.

A ſufficient opening of the external parts being thus obtained, the operator is now to ſearch with his fingers for the bladder; which he will commonly be ſure to diſcover immediately above the pubes. With the fingers of his left hand he ought now to preſs back the peritonæum, with the inteſtines contained in it, and with the ſame ſcalpel with which the preceding ſteps of the operation were effected, he is to penetrate the

the bladder itſelf at its moſt prominent part. This opening into the bladder ought at once to be made ſo large as to receive the two fore fingers of the operator's left hand; which being introduced, the inciſion is to be enlarged to the length of about three inches, by running a probe pointed biſtoury along one of the fingers down towards one ſide of the neck of the bladder. The inſtant that the fingers are introduced into the bladder, the ligature upon the penis ſhould be taken off, ſo as to admit of the water contained in it being evacuated by the urethra, otherwiſe the whole of it will be immediately diſcharged by the wound.

The inciſion being completed in the manner we have directed, the operator ought to ſearch with his fingers for the ſtone, and, if poſſible, he ſhould extract it without the aſſiſtance of any inſtrument: But if this is found to be impracticable, the forceps muſt, no doubt, be employed. One great advantage attending this operation is, that as very little force is neceſſary for extracting the ſtone, ſo it is here rarely known to break: But when this misfortune occurs, the pieces will be more eaſily removed by the fingers alone, than with any of the ſcoops commonly employed. The ſtones being removed, the ſuperior part of the wound in the teguments ought to be drawn together, either by the means of ſtrong adheſive plaſters, or by the twiſted ſuture, care being taken to leave at leaſt an inch and half in the under part of it open, in order to evacuate any urine that may be thrown out from the wound in the bladder into the contiguous parts. It might even be proper to keep the whole external inciſion open till the wound in the bladder is reunited; but as the bowels, ſupported now by the peritonæum only, would be apt to protrude at this opening, and as ſuch an occurrence would prove not only troubleſome, but even dangerous, it ought to be guarded againſt as much as poſſible.

With

With this view the bowels ſhould be kept open by the uſe of gentle laxatives, and the patient during the whole cure ought to be kept with his head and upper part of the body conſiderably lower than the pelvis.

The parts cut in this operation are not any where nearly ſurrounded by bone; on this account large ſtones can be extracted with more eaſe by this than by any other method: And as the wound in the bladder is made at a diſtance from its neck, fiſtulous openings are not ſo apt to enſue from it as from inciſions made in the perinæum. Theſe are two advantages which attend this mode of operating; but the objections to it are various.

1. When it is found that the bladder cannot admit of ſuch diſtention as to be elevated above the oſſa pubis, it is almoſt impoſſible to make an opening into it without dividing the peritonæum. Much danger muſt undoubtedly be the conſequence of this, from the protruſion of the bowels which will probably occur, from the acceſs which is given to the external air, and from the urine eſcaping into the cavity of the abdomen.

We are informed, indeed, by writers on this ſubject, of a protruſion of part of the bowels having ſometimes happened in the high operation, without any bad conſequences being induced by it; the wounds being found to cure, and the patients afterwards to do as well as if no ſuch occurrence had happened. Such favorable terminations, however, of accidents of this kind could not probably be frequent; and this is, accordingly a very ſtrong objection to the high operation.

2. After the high operation, and during the whole courſe of the cure, the urine, in many inſtances, paſſes readily by the urethra; but it happens not unfrequently, in conſequence of inflammation about the neck of the bladder or ſome other cauſe, that the natural courſe of the urine is obſtructed. In theſe in-

ſtances, from the wound in this operation being made in the anterior part of the bladder, the urine is very apt to be diffuſed in the cellular ſubſtance between the peritonæum and abdominal muſcles, and between the bladder and pubes; and as no proper vent can be procured for it, ſinuſes are frequently produced, which always terminate in much diſtreſs.

3. It has been obſerved, whenever the patient's habit of body is not altogether good, that it is almoſt impoſſible to obtain a cure either of the wound of the bladder, or of the external teguments. This, it will be ſaid, may be alleged as an objection to every operation of importance: But although, in every other method of performing the operation of lithotomy, the wound both of the bladder and of the more external parts heals more eaſily in ſome conſtitutions than in others; yet from all the writings we have on this ſubject it is clear, that any depravity of conſtitution is, in this reſpect, always productive of much more diſtreſs after the high operation than what commonly occurs from the ſame cauſe in the uſual method of operating *in perinæo*.

4. This operation is confined almoſt ſolely to patients below thirty years of age: For although it was frequently practiſed on older people, and although no particular reaſon can be given why it ought not to ſucceed in more advanced ages; yet we learn from almoſt every author who has wrote upon it, particularly from Middleton, Smith, Douglas, and Heiſter, that a very ſmall proportion only recovered of ſuch as were above their thirtieth year.

It is perhaps for one or other of theſe reaſons that the high operation has fallen ſo generally into diſuſe, and that it has not been much practiſed for a great length of time in almoſt any part of Europe. But although this method of operating is attended with hazard, and is frequently followed with inconveniences;

ences; yet there is reaſon to think, that, on ſome occaſions, it might be practiſed with advantage.

The moſt material objection to the modern, or lateral method of cutting for the ſtone, ariſes from the bruiſing of the ſoft parts againſt the contiguous bones in the extraction of a large ſtone; which is ſo much the caſe, that we may conſider the riſk from the lateral operation to be almoſt in proportion to the ſize of the ſtone. When a ſtone is ſmall and is eaſily extracted, the proportion of deaths in the lateral operation is very ſmall: But whenever a ſtone is of ſuch a ſize as to weigh ſeven, eight, or ten ounces, this operation perhaps is one of the moſt dangerous to which a patient can ſubmit. Different inſtances have occurred, too, where the ſtone has been ſo very large, as to render its extraction by the lateral operation impracticable, by all the force that could be applied; and ſome caſes are on record in which there was a neceſſity of having recourſe to the high operation, after the operator had failed in extracting the ſtone by the uſual method of cutting in the perinæum.*

When, therefore, from the long continuance of the diſeaſe; from the ſenſe of weight about the neck of the bladder; and particularly from the touch by the finger *in ano*, we have reaſon to ſuſpect the ſtone to be of a large ſize, it ought to be an object of conſideration, how far it may be proper to avoid the lateral, and, in certain circumſtances, to employ the high operation. The circumſtances we allude to reſpect the age of the patient, the ſoundneſs of his conſtitution, and the poſſibility of diſtending the bladder ſo as to raiſe it above the brim of the pelvis. Theſe circumſtances may be favorable where the ſtone is of a large ſize; and when it is found to be ſo, the high operation, although perhaps leſs advantageous in the general run of calculous caſes than the lateral method of cutting,

* This diſagreeable occurrence, we find, happened to Heiſter. Vid. Heiſter's Surgery, P. II. Sect. V. chap. cxlii.

cutting, may be practiſed with greater probability of ſucceſs than any other with which we are acquainted.

Having now ſaid all that is neceſſary reſpecting the *Apparatus Altus*, we ſhall proceed to the conſideration of what has uſually been termed the Lateral Operation.

SECTION VII.

Of the Lateral Operation.

IN the operation of lithotomy, as it was formerly practiſed by the great apparatus, the external inciſion was made in nearly the ſame part that it is now in the lateral operation; but the two methods of operating differ materially in every other circumſtance.

The original invention of the lateral operation is due to a French Eccleſiaſtic commonly known by the name of *Frere Jacques*. This operator firſt appeared at Paris in the year 1697, when, by the ſucceſsful event of a few caſes, he was allowed to operate upon a great number. But it ſoon appeared to practitioners of diſcernment, that the fame he had acquired would not probably be of long duration. For, with a very imperfect knowledge of the anatomy of the parts concerned in the operation, a bad aſſortment of inſtruments, and a total neglect of his patients after the operation, it was almoſt impoſſible that much ſucceſs could reſult from his method. His manner of operating was as follows.

The patient being properly ſecured either upon a table or on a bed, a common ſolid ſtaff was introduced into the bladder by the urethra, and the handle of it being carried over the right groin, the convex part of it was made to elevate the teguments and other parts on the left ſide of the perinæum.

With a ſtraight biſtoury he now made an inciſion through the ſkin and cellular ſubſtance, beginning between

tween the anus and the tuberosity of the ischium, and continuing it upwards along the left side of the perinæum, at a small distance from the rapha, till it extended at least one half of the course of the perinæum. With the same knife he now went on along the direction of the staff, to divide the parts between the external incision and the bladder; which he also opened with the point of this very knife with which the other steps of the operation had been executed. At this opening in the bladder he first introduced the index of his left hand, in order to discover the situation of the stone; and having withdrawn the staff, he laid hold of the stone with a pair of forceps, and extracted it in the usual manner. The patient was now carried to bed; and no farther attention was paid to him by the operator, who never applied any dressings, as he trusted the subsequent management of every case to the nurse or other attendants.

In consequence of this unpardonable negligence, and by his frequently cutting parts in the course of the operation which ought to have been avoided, a great proportion of those he operated upon died; no less, we are informed, than twenty five of sixty.* Hence Jacques soon fell into disrepute; and although he afterwards introduced considerable improvements in his method of proceeding, particularly in being more attentive to the subsequent management of his patients, and in using a grooved staff instead of a solid one, yet his reputation in Paris never again gained ground; nor do we find that his method was ever attended with much success, either in Holland, or in the various parts of Germany where he afterwards practised.

For with so much inattention did he proceed, that although he professed to cut directly into the body of the bladder, without injuring either the urethra or prostate gland; yet in the dissection of such bodies as

* *Vide* Morand Opuscules de Chirurgie, part ii. p. 54.

as died of the operation, it was found that on many occaſions the proſtate gland was divided, together with the veſiculæ ſeminales. In ſome inſtances, the bladder was cut in two or three different parts; in others the rectum was divided; and it frequently happened that the bladder was found to be entirely ſeparated from the urethra.* We need not wonder, therefore, that this practitioner, as well as his method of operating, ſoon fell into diſcredit. But although this was a conſequence which neceſſarily enſued from the ill ſucceſs that attended his practice; yet the world, it muſt be acknowledged, is much indebted to Jacques, for having laid the foundation of the lateral method of cutting for the ſtone, which, in its preſent improved ſtate, is practiſed with ſo much ſucceſs over all Europe.

The famous Rau was the firſt who endeavoured to improve this operation of Frere Jacques, which he did by uſing a ſtaff with a very deep groove, which enabled him to continue his inciſion into the bladder with more certainty than it was poſſible to do without this aſſiſtance. But Rau, afraid of wounding the proſtate gland, introduced a refinement into his method of cutting, which, in the event, proved extremely prejudicial, and was probably the cauſe of its being afterwards laid aſide. For, inſtead of dividing the urethra and proſtate gland, by which means the extraction of the ſtone would have been much facilitated, he diſſected with much caution by the ſide of the proſtate, till the convex extremity of the ſtaff was diſcovered in the bladder itſelf. At this part an inciſion was made into it, and the ſtone was afterwards extracted, in the manner then practiſed for cutting with the great apparatus.

By this method of operating, the rectum and veſiculæ ſeminales were in great danger of being injured; the

* For a particular account of Frere Jacques's method of operating, ſee Dr. Liſter's journey to Paris; the works of Dionis, Meri, Collet, Saviard, and Morand.

the ſtone was extracted with difficulty; and from the depth of the inciſion the urine did not paſs eaſily off by the wound, ſo that troubleſome ſinuſes were very frequently forming.*

Theſe inconveniences prevented this operation of Rau's from ever being generally received, and ſuggeſted to the celebrated Cheſelden the lateral method of cutting, as it is now, with a few alterations, very univerſally practiſed.

As this operation of Mr. Cheſelden's is deſcribed by many writers in Surgery, it is not here neceſſary to enter into a detail of it: We ſhall, therefore, now proceed to deſcribe the lateral operation in its preſent improved ſtate.

In order to prevent the patient from being under the neceſſity of going ſoon to ſtool after the operation, the bowels ought to be thoroughly emptied by a laxative given on the preceding day; and with a view to evacuate the contents of the rectum entirely, an injection ſhould be given a few hours before the operation is performed.

When the bladder is in a collapſed ſtate, it is liable in this operation to be cut in different parts; the patient ought therefore to be deſired to drink plentifully of ſome diluent liquor, and to retain his urine for ſeveral hours before he is laid upon the table: And when the irritation produced by the diſeaſe is found to render a voluntary retention of the urine impracticable, it ought to be effected by a ſlight compreſſion upon the penis.

Theſe circumſtances being attended to, and the perinæum and parts about the anus being ſhaved, the patient is now to be laid upon a table for the operation. The moſt convenient height for this table

* Rau himſelf kept his method of operating as much concealed as poſſible. But an account of it was publiſhed after his death by Albinus; who, by aſſiſting frequently at his operations, became perfectly maſter of his manner of performing. *Vide* Index ſuppellectilis anatomicæ, &c. Lug. Batavorum.

ble is three feet two inches. It ought to be made perfectly firm: And in order to afford sufficient space for the patient to lie upon, it ought to be about three feet eight inches long, and at least two feet and a half wide.

As it is of much importance to have the patient properly secured, it becomes necessary to attend particularly to this circumstance. The most certain method of effecting it is as follows: Let a noose be formed in the double of a piece of broad firm tape about three feet in length; the patient's wrists being introduced at this noose, he ought then to take a firm hold of the outside of the ankle of the same side, when, by different turns of the tape round the hand, ankle, and foot, his hand is to be effectually secured in this position; and this being done on one side, the hand and foot of the opposite side are to be firmly tied together in a similar manner.

The operator ought now to introduce a grooved staff, of a size proportioned to the parts through which it is to pass. These staffs are represented in Plate XII; the artist who makes them ought to be very attentive in rounding off the edges of the grooves, otherwise they are apt to injure the urethra; and the further extremity of the groove ought to be perfectly free and open, otherwise it is difficult to disengage the gorget from it after it has been introduced into the bladder. As the groove is only necessary in the convex part of the staff, and from that to its point, the handle of the instrument down to the commencement of the convexity, ought to be entirely solid, so as to admit of the penis being pressed upon it, without being hurt either by the hand of the assistant, or by a piece of tape, which may be sometimes necessary, as we have already advised, for preserving the urine from being evacuated.

It is necessary to remark, that more attention ought to be paid to the length of the staff than is commonly

ly done. These instruments are generally shorter than they should be; so that when, in the course of the operation, the handle of the staff happens to be pressed down upon the groin by the assistant, the point of it is very apt to slip out of the bladder altogether; a circumstance which must always be productive of much hazard and inconvenience. Care, therefore, should be taken to have the staff always of a sufficient length.

The stone being again distinctly felt, not only by the surgeon himself, but by his assistants, the patient must be then put into that posture in which he ought to be kept during the remainder of the operation. The table intended to be used ought to be perfectly level; but, that the patient may lie with as much ease as possible during the operation, a pillow may be put under his head, and, in order to raise the pelvis considerably higher than the abdomen, two pillows at least ought to be laid under the buttocks, which should be made to project an inch or two over the end of the table.

This direction we have given for elevating the buttocks, is a matter of much importance, although it is seldom attended to by operators; indeed, the very reverse is commonly practised, the head and upper part of the body being generally kept a good deal higher than the pelvis. This, however, must proceed entirely from inattention on the part of the surgeon: For the least reflection may convince us, that the more erect the body is kept, the greater pressure must be produced by the intestines upon the bladder; and if by such pressure the fundus of the bladder is pressed down upon its neck, the risk of its being wounded must be very great.

Of such patients as have died of this operation, I have in two different instances found on dissection, that the bladder was wounded in three different parts: In its cervix, as is always the case when the gorget is

of a ſufficient length ; in its ſide conſiderably above the cervix ; and, again, very near to its moſt ſuperior part. Now this is an accident which can never happen, if the directions we have given are attended to ; for when the bowels are prevented from falling upon the bladder, by keeping the buttocks elevated above the reſt of the body, and if at the ſame time the bladder is properly diſtended with urine, it muſt be altogether impoſſible, in the uſual lateral operation, to injure it in an improper part. But if this precaution of having the bladder diſtended during the operation is neglected, at the ſame time that the bowels are, by an elevated poſture of the upper part of the body, allowed to fall into the pelvis, the bladder muſt be ſo completely collapſed, and its fundus puſhed ſo much down upon its neck, as muſt frequently be the cauſe of much unneceſſary hazard.

Beſides theſe two caſes I have mentioned, in which the bladder was after death found to be wounded in different parts, we find a very candid acknowledgment made by a celebrated lithotomiſt, of his being once ſo unfortunate in the lateral operation, as to have an immediate protruſion of a conſiderable portion of the ſmall guts at the wound.*

Such an occurrence would have diſconcerted many operators : But, fortunately for the patient, the operation was in this caſe completely finiſhed ; the bowels were reduced, and a perfect cure was obtained. Mr. Bromfield attempts to account for this protruſion of the bowels in a different manner : But we are much inclined to think, that it muſt have been owing to the pelvis not having been ſufficiently raiſed above the reſt of the body, and to the bladder having been in a collapſed ſtate at the time the inciſion was made into it. For this author, it muſt be remarked, inſtead of ordering the bladder to be diſtended at the time

* Vid. Mr. Bromfield's Chirurgical Obſervations and Caſes Vol. II. p. 264.

time of operating, desires expressly that it may be emptied immediately before the operation.*

Matters being adjusted in the manner we have directed with respect to the patient, an assistant on each side is to secure his legs and arms: One must prevent him from moving the upper part of his body; another must lay hold of the staff; and a fifth will be required to hand the necessary instruments to the operator.

The surgeon, after having again felt the stone with the staff, is now to make the hand of it pass over the right groin of the patient, so as that the convex part of the instrument may be distinguished on the left side of the perinæum: And in this position it ought to be preserved by the assistant, who with his right hand should lay hold of the handle of the staff, while with his left he elevates and supports the scrotum.

The thighs of the patient being sufficiently separated by the assistants, and the surgeon being seated between the patient and the window, in such a manner as to make the light fall directly upon the parts to be cut, an incision is now to be made through the skin and cellular substance, at least four inches in length in a full grown person, and so in proportion in smaller sized people; beginning a little to the left side of the rapha, about an inch from the termination of the scrotum, and proceeding in an oblique direction along the perinæum, till it is made to run at an equal distance between the tuberosity of the ischium and the anus, which last it ought to pass at least an inch.

As the success of the operation depends in a great measure on this part of it being properly executed, the attention of beginners ought to be particularly fixed upon it. From timidity or inattention, which always proves prejudicial to the patient, this external incision is frequently made much shorter than it should be; in many instances, instead of four inches, I have seen

* Page 228, Vol. II.

ſeen it, even in the largeſt adult, ſcarcely two. The conſequence of this is, that the muſcles, and other parts below, cannot be properly divided; the operator has no freedom in proſecuting the other ſteps of the operation; and if the ſtone is large, the parts through which it has to paſs muſt be much more bruiſed and lacerated than if they had been freely divided by the knife; and as there is no riſk whatever in making the external inciſion free and ample, it ought, in every inſtance, to be done. Much hazard may occur from a ſmall inciſion of the teguments and muſcles; but no detriment can enſue from their being largely laid open.

By this firſt ſtroke of the ſcalpel, the ſkin and cellular ſubſtance ſhould be freely divided, ſo as to bring the ſubjacent muſcles completely into view; when, by a continuation of the inciſion, the erector penis, accelerator urinæ, and tranſverſalis perinæi, are alſo to be divided; and as ſome part of the levator ani is intermixed with theſe muſcles, it will likewiſe be cut.

As there is no danger found to occur from a free diviſion of theſe parts, and as a large opening not only facilitates the extraction of the ſtone, but admits of any blood veſſel that happens to be cut being eaſily ſecured by a ligature, which can never be done when the inciſion is ſmall, every operator, as we have ſaid, ought to be particularly attentive to this circumſtance. In general, the arteries with which theſe muſcles are ſupplied are not ſo large as to render this precaution neceſſary; but whenever it is found to be otherwiſe, and that a conſiderable veſſel has been cut, and eſpecially if the patient is weak and emaciated, a ligature ought to be immediately applied before the ſurgeon proceeds to the other ſteps of the operation.

In the ordinary method of performing this operation, the ſurgeon now proceeds to lay open the urethra, and enters the point of the knife into the ſubſtance of the bulb itſelf. But this adds greatly to the

hazard

hazard of the operation: For, independently of the blood veſſels of the bulb being frequently pretty large, but which indeed may, when the external inciſion is extenſive, be ſecured, ſinuſes are much more apt to form; and the cure of the wound is therefore much more tedious when this part is divided, than when no injury is done to it; and as a diviſion of the bulb is not by any means neceſſary, it ought on every occaſion to be avoided. When, therefore, the inciſion of the muſcles is completed, the operator ought to ſearch for the ſtaff with the index of his left hand; and having found it, he is now to puſh the point of his finger along the courſe of it till he paſſes the bulb, when, with the edge of his knife turned towards the groove of the ſtaff, he is to divide the membranous part of the urethra in its whole courſe, from the bulb to the proſtate gland; and as the finger is made uſe of as a director, and as by means of it the rectum is effectually preſerved from being injured, this inciſion of the urethra may be made with perfect ſafety. Indeed, there is in general ſuch a quantity of cellular ſubſtance between the urethra and rectum, as renders it impoſſible, in this part of the operation, to cut into the gut, if the ſurgeon is not either very unſteady or inattentive: And by means of the precaution we have recommended, of keeping the fore finger of the left hand always between the knife and the inteſtine, it may in this manner be on every occaſion very certainly avoided.

The inciſion of the urethra being now completed, the proſtate gland, which may be evidently diſcovered by the finger, is next to be divided. In the hands of an expert ſurgeon, a patient would be equally ſafe by having the operation finiſhed with the ſcalpel as with any other inſtrument: For, by continuing the inciſion of the urethra, and carrying on the ſcalpel ſo as to divide the proſtate gland laterally, if the finger is ſtill continued between the knife and the rectum, no riſk whatever could occur from it: But as this part

of

of the operation is performed entirely by feeling, without the assistance of the eye sight; and as many operators are not so much accustomed to this kind of business as, in such circumstances, to have a sufficient degree of steadiness, it is probable the rectum would be frequently wounded if the scalpel was usually employed for finishing the operation.

This inconvenience, however, of wounding the rectum, may be effectually avoided by using a cutting director, or Gorget, as it is termed, instead of a scalpel: This instrument was originally the invention of Mr. Hawkins at London. It is represented in Plate XIV; and in Plate XIII different views of an instrument are delineated, which I consider as a very material improvement of Mr. Hawkins's gorget. The gorget of Mr. Hawkins is contracted too much at the cutting part of it, which prevents it from dividing the prostate gland sufficiently. If we were to use a gorget much wider in the cutting part of it than is usually done, the opening through the prostate gland might indeed be made extensive enough: But the gorget in common use will by no means effect this; the division of this gland being in general quite too small, either for the extraction of a stone, or even for the introduction of the forceps, without much laceration; a circumstance which we ought to guard against as much as possible.

The gorget in ordinary use is made to expand greatly behind; the diameter of the blunt part of it being at least twice the extent of that of the cutting point. This will appear to be very unnecessary, when we consider, that the only use of the gorget, after it has cut through the prostate gland, is to serve as a conductor to the forceps; and as this purpose may be answered equally well by a director that does not expand to near the extent that the gorget does, it is obviously improper to have this instrument so wide as it is commonly made. But farther, the impropri-

ety

Plate XIII

Fig. 1.

Fig. 2

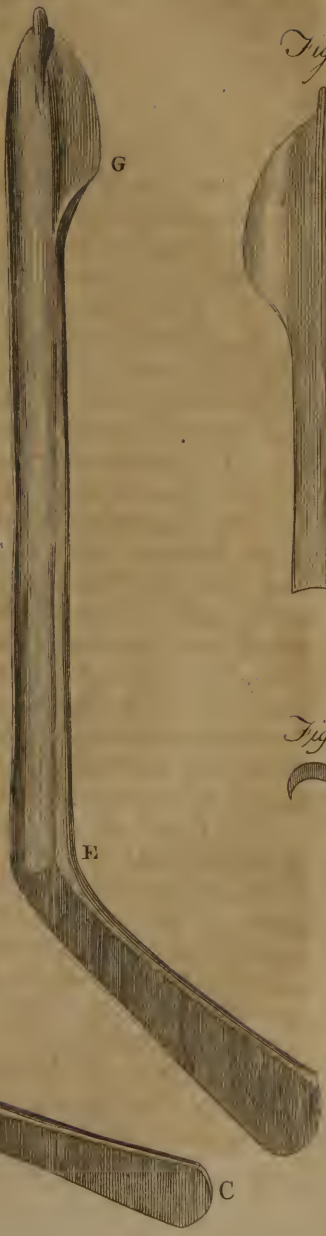


Fig. 3.

Fig. 4

ety of this conſtruction is ſtill more evident, when we compare the ſize of the common gorget with the parts through which it has to paſs: For it is perfectly evident, that the latter, and particularly the urethra, muſt be greatly injured by the forcible introduction of the former; the back part of the gorget being ſo wide and deep, as to render its paſſage through the urethra quite impracticable, without much laceration.

The cutting director we have mentioned above, will be found to poſſeſs all the advantages of the gorget, without any of its inconveniences: The cutting part of it expands more than that of the gorget, it therefore divides the proſtate gland more freely; and as the blunt part of it is much contracted, no injury is done to the urethra on its being puſhed into it. To thoſe who have never uſed this inſtrument, and who thereby may have a partiality for the gorget, it may perhaps appear that it is not ſufficiently wide for ſerving as a director to the forceps: This, however, is not the caſe; and it will ſoon be found, that it is not only more eaſily introduced than the gorget, but that it anſwers equally well for conducting either the finger or the forceps.

It has been objected to this inſtrument, that it will not probably make ſuch a free diviſion of the muſcles as is obtained by the gorget. This obſervation, however, proceeds ſolely from prejudice in favour of an inſtrument with which practitioners are as yet better acquainted, and which has indeed been deſervedly much employed; but it is thrown out without due reflection on its import. We have already endeavoured to inculcate the neceſſity of a free diviſion of the teguments and muſcles in this operation; but whoever conſiders this point with attention will ſee, that this ought to be effected by the ſcalpel alone, and that it ſhould not depend in any degree upon the gorget. All that ſhould be left for the gorget or cutting director to do, is to divide the proſtate gland with a

ſmall

ſmall portion of the neck of the bladder. Some practitioners have indeed recommended inſtruments for carrying the inciſion into the body of the bladder; but this is a very hazardous attempt, and it is not in any reſpect neceſſary: For as ſoon as the proſtate and neck of the bladder are divided, the forceps are admitted with much eaſe; and the bladder itſelf is ſo eaſily dilated, that it very readily yields to the paſſage of the ſtone, however large it may be. We would wiſh to have it underſtood, that it is not the ſize of the wound in the bladder which renders the extraction of ſtones eaſy or difficult; and that it is the previous free inciſion of the muſcles and proſtate gland upon which this entirely depends.

The membranous part of the urethra being divided by the ſcalpel in the manner we have directed, the nail of the index of the left hand ought to be introduced into the groove of the ſtaff, in order to ſerve as a conductor to the point or beak of the cutting director. And the ſurgeon having no further occaſion for the ſcalpel, muſt now lay it aſide; and having introduced the point of the director into the groove of the ſtaff, he is now to take the handle of that inſtrument from the aſſiſtant; and having raiſed it conſiderably from the groin of the patient in which it lay, he muſt with his left hand preſerve it firm in this ſituation, while with his right he puſhes on the director till it has paſſed freely into the bladder, a circumſtance which is rendered evident at once by the urine ruſhing plentifully out at the wound. In executing the firſt part of the operation, the ſurgeon ought by all means to be ſeated; but in paſſing the gorget or director into the bladder, as likewiſe in the extraction of the ſtone, he ought to ſtand immediately before the patient, as in this poſture theſe ſteps of it are more eaſily performed.

Much attention is neceſſary, in this part of the operation, in raiſing the ſtaff to a proper height before puſhing

puſhing on the gorget. The ſtaff ought to form nearly a right angle with the body of the patient; and if it be kept ſufficiently firm in this poſition, the gorget or director may be puſhed on with great ſafety, as the beak of the inſtrument, if this direction is attended to, can ſcarcely eſcape from the groove of the ſtaff. But if the elevation of the ſtaff is either much greater or much leſs than this when the gorget is puſhed forward, its point inſtead of getting into the bladder muſt be forced out of the groove, and paſſing between the rectum and bladder, or between the bladder and pubes, it muſt here run the riſk of doing much miſchief. I have known even expert ſurgeons, from an unpardonable degree of inattention, fall into this error with regard to the height of the ſtaff. Younger practitioners, therefore, cannot be too much on their guard againſt it.

While attention is thus given to the elevation of the ſtaff, care ought alſo to be had that the beak of the director or gorget be exactly fitted to the groove intended to receive it; for if theſe are not properly adapted to one another, the gorget cannot run ſo eaſily as it ought to do. Beſides, if the beak of the inſtrument is turned a little inwards, as is repreſented in Plates XIII and XIV, it is puſhed forward with more ſafety than when the point of it is either in a direct line with the inſtrument, or, perhaps, ſomewhat turned back, as is too frequently the caſe.

In order to render this part of the operation perfectly ſafe, different inventions have been propoſed for fixing the beak of the cutting gorget ſo effectually in the groove of the ſtaff, as to prevent it from getting out of it till it has paſſed into the bladder: But every contrivance of this kind produces ſome difficulty in paſſing the inſtrument; and beſides, there is not the leaſt neceſſity for it, as no operator can poſſibly go wrong if he attends ſufficiently to the directions we have given.

As ſoon as the gorget has freely entered the bladder, the ſtaff ought to be withdrawn; and this being done, the next ſtep in ordinary practice is, to introduce the forceps immediately; but as the ſtone may be frequently felt by the finger, and as no other method ſerves ſo effectually to diſcover its real ſituation, this precaution of introducing the finger into the bladder ought never to be omitted. If the ſtone cannot be felt by the finger, the pain of the patient is not increaſed by its introduction; and if the operator is lucky enough to diſcover it, he is thereby inſtructed with ſome certainty of the beſt direction for the forceps.

The ſituation of the ſtone being in this manner diſcovered, or if, upon trial, it is found that the finger cannot reach it, a pair of forceps, proportioned to the ſize of the patient, are to be introduced along the courſe of the director or gorget, while the latter is to be immediately withdrawn.

In an operation of ſuch importance as this, the moſt trifling circumſtance is worthy of attention; for the more obvious and leading parts of it may be performed in the moſt maſterly manner, and the whole be rendered unſucceſsful by the operator not attending ſo accurately as he ought to do to the more minute ſteps of it. Even the method of withdrawing the cutting director or gorget, is a matter which requires attention, much more, indeed, than is commonly given to it. After the forceps are introduced, the gorget ought to be ſlowly withdrawn in the very exact direction by which it is entered: For if it be turned in any degree either to one ſide or another, it muſt of neceſſity make another inciſion, not only in the proſtate gland, but in all the other parts through which it is made to paſs; the impropriety of which is too obvious to require any further animadverſion.

If the ſtone has been previouſly diſcovered by the finger, it is commonly eaſily laid hold of with the

forceps;

Plate XV.

Plate XIV.

Fig. 1.

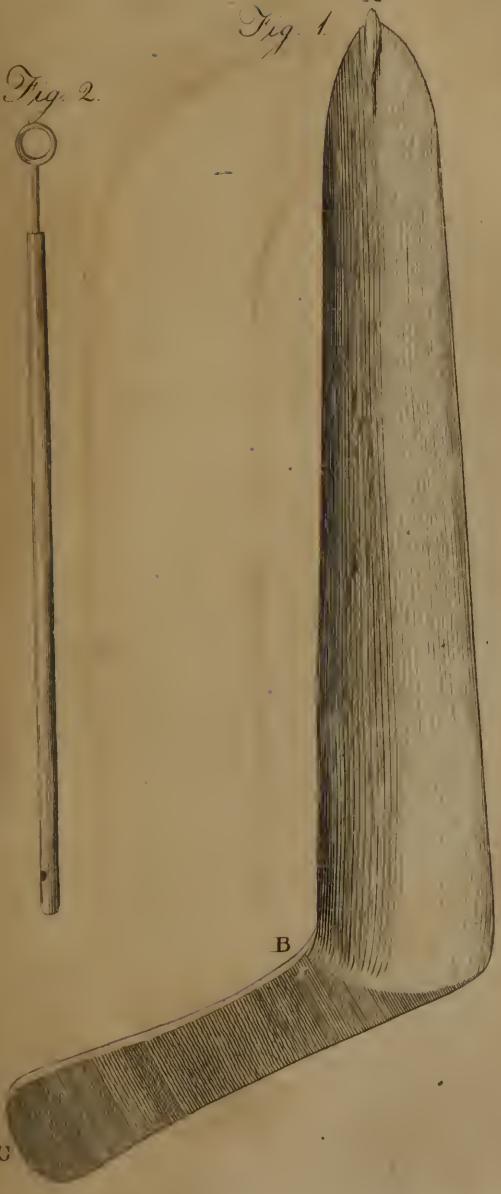


Fig. 2.

Fig. 3.

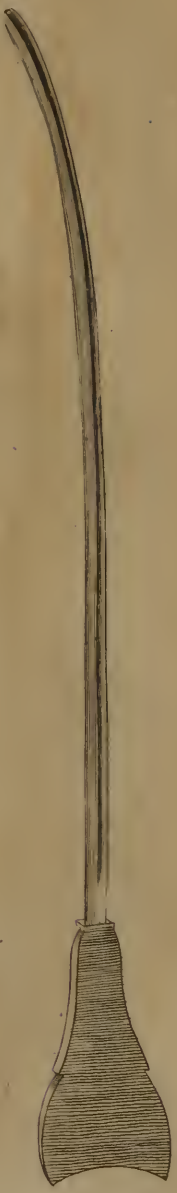


Plate XVI.

Fig. 1.

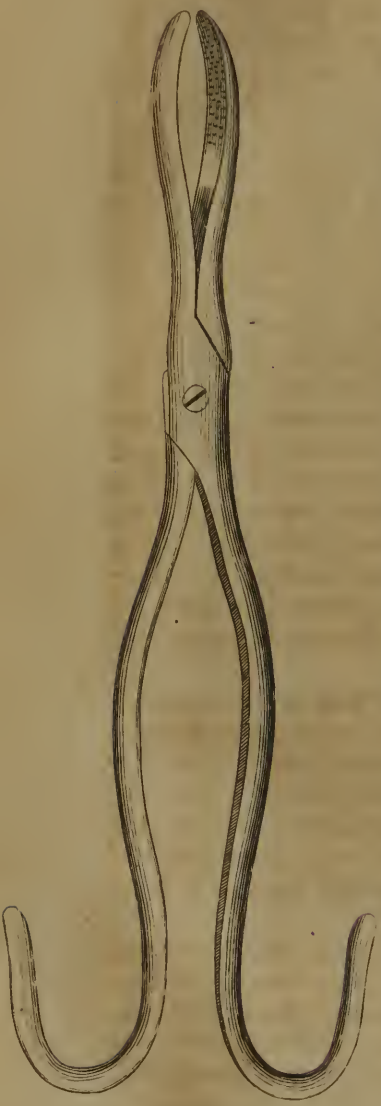


Fig. 2

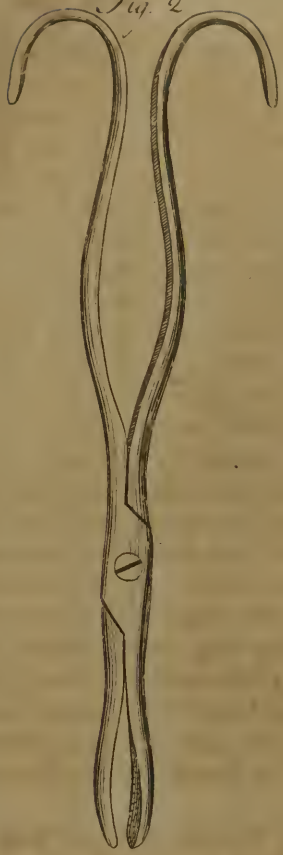
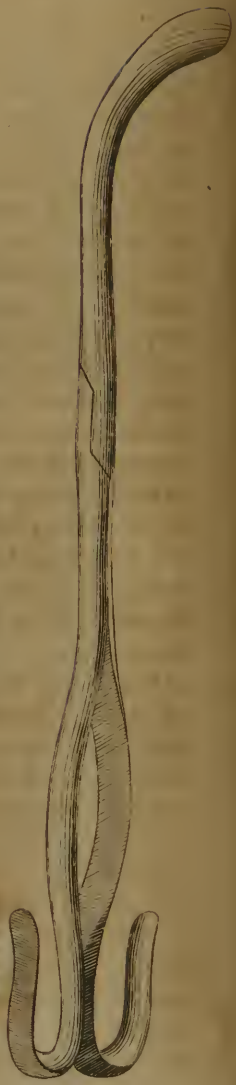


Fig. 3



forceps; but when the finger has not been able to reach it, it is on ſome occaſions with much difficulty met with. The forceps muſt neceſſarily be introduced ſhut, that is, with their blades as near to one another as their form admits of; for, with a view to prevent them from laying hold of the bladder, they ſhould be ſo conſtructed as not to meet at any part except at their axis, by at leaſt the tenth part of an inch. But as ſoon as they have entered the bladder, they ſhould be gradually opened; and in this expanded ſtate ought to be eaſily moved about, with their handles ſometimes depreſſed and ſometimes elevated, till the ſtone is diſcovered, when it is to be immediately laid hold of. It frequently happens, however, even with very expert ſurgeons, eſpecially when the ſtone is ſmall, that it is not readily diſcovered by the forceps. In ſuch inſtances it is ſometimes met with near to the fundus of the bladder; but it is moſt frequently found concealed in the under and back part of it, near to its neck, in that bag which we have mentioned as being formed by the natural preſſure of the urine. When it is found to be in this ſituation, nothing will bring it ſo readily into contact with the forceps, as elevating this part of the bladder by introducing the finger into the rectum.

In general, ſtraight forceps, ſuch as are repreſented in Plate XVI, fig. 1. and 2. are preferable to thoſe that are much crooked, delineated in fig. 3. For they not only prove more effectual for extracting the ſtone, but ſerve equally well with the others for diſcovering it. Every operator, however, ought to be provided with all the varieties of forceps that are now in ordinary uſe.

When much difficulty occurs in diſcovering the ſtone, it is frequently alleged by operators, that this proceeds from its being contained in ſome preternatural bag or cyſt; and when it is laid hold of by the forceps, and requires an unuſual degree of ſtrength to

extract

extract it, this is commonly said to arise from the stone adhering to the coats of the bladder. That the weight of a stone will sometimes form a partial cavity for itself, by pressing that part of the bladder on which it lies into the neighbouring soft parts, there is no reason to doubt; and in some instances the bladder is found to have been so much contracted round a stone, as to form almost two distinct bags. Such occurrences, however, are exceedingly rare: And the adhesion of stones to the bladder, we believe to be still more so, if it ever takes place. Stones have indeed been frequently found covered with the coagulable part of the blood, which on some occasions becomes so firm and tough, as to have the appearance of an organised membrane; but we are perfectly unacquainted with any process of nature by which an adhesion can be produced between the bladder and a stone contained in it.

It is very improbable that it can take place in consequence of a communication of blood vessels betwixt the bladder and stone: And it is equally improbable that it can be produced merely by agglutination; for, by the intervention of the urine, with which the bladder is constantly moistened, such an effect must be very certainly prevented.

But it is not reasoning alone that militates against this opinion. For although such an occurrence has been frequently mentioned by authors, yet we do not meet with one authenticated instance of any firm adhesions betwixt the bladder and stones contained in it being discovered after death: We are therefore led to conclude, that this idea is entirely void of foundation; and that it has probably originated from the misconduct of operators, who, by making the external incision too small, or by not dividing the muscles and prostate gland sufficiently, have experienced much difficulty in extracting a stone of even a moderate size, and who, to escape censure, have suggested

ed the poſſibility of ſtones adhering to the internal coat of the bladder.

When the ſtone is laid hold of by the forceps, the operator, before he proceeds to extract it, ought to introduce his finger into the bladder, in order to diſcover whether it is properly fixed in the forceps or not. In many inſtances, this is of much advantage; for, when it is diſcovered that a ſtone of any conſiderable length is laid hold of in ſuch a manner as to have its longeſt diameter made to preſs in a tranſverſe direction with reſpect to the opening in the bladder, much pain and laceration, which would undoubtedly occur from extracting it in this direction, may be eaſily prevented, either by turning the ſtone with the point of the finger when this is found to be practicable, or by letting it ſlip altogether out of the forceps, and again endeavouring to lay hold of it in a more favourable poſition. When the operator is certain that this is properly accompliſhed, he is then to proceed to the extraction of the ſtone, which ought to be done in a very ſlow and gradual manner: He ought to hold the forceps firmly in both hands, his right being applied towards the extremity of the handles, and his left near to the common axis.

In ordinary practice, if the ſtone does not come readily away, the force made uſe of is commonly applied ſo as to dilate the parts equally in every direction. The ſtone is made to move not only upwards and downwards, but laterally; and, on ſome occaſions, even a rotatory motion is given to it. Nothing, however, can be more deſtructive to the parts through which the ſtone muſt paſs than ſuch a practice, while at the ſame time it is evidently ill calculated for facilitating the extraction of it.

Inſtead of moving the ſtone in this manner, the preſſure ought to be made almoſt entirely downwards; not directly from the ſymphyſis of the pubes towards the anus, but in the courſe of the external wound, which

which ought, as we have already ſaid, to run between the anus and the tuberoſity of the iſchium. As it will be readily admitted, that the force employed in extracting a ſtone will prove more uſeful when exerted upon ſoft yielding parts, than when applied immediately upon a bone; ſo, whoever attentively conſiders the anatomy of the parts concerned in this operation, will ſee the propriety of the advice we have now given. The opening into the pelvis is at this place ſo extremely narrow, that a very ſlight examination muſt convince any one, that in the extraction of a ſtone no advantage can be derived from lateral preſſure. If again the ſtone is preſſed upwards, it muſt preſs againſt the bones of the pubes; for in this direction nothing intervenes between theſe bones and it, except the urethra, and a ſmall quantity of cellular ſubſtance: And if it be directed towards the anus, it muſt preſs the rectum againſt the point of the coccyx; a circumſtance which muſt not only produce much immediate diſtreſs to the patient, but which muſt even add to the hazard of the operation.

The rotatory motion which in this operation is ſometimes given to a ſtone unites all theſe diſadvantages; but by carrying the preſſure downwards in the courſe of the wound ſo as to fall between the anus and iſchium, every inconvenience of this kind is avoided, and a more extenſive dilatation is obtained than can poſſibly be procured in any other direction.

By a proper and gradual application of preſſure in this direction, the ſtone, if it is not very large, will be at laſt extracted: In the courſe of the extraction, however, if the operator finds conſiderable reſiſtance to the paſſage of the ſtone, he ought to examine the ſtate of the divided parts; and if any part of the muſcles which ought to have been cut are ſtill found to be entire, they ſhould be immediately laid freely open; and the eaſieſt method of doing this, is, to ſecure the ſtone

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in the forceps with the left hand, while a ſcalpel is employed in the other for effecting what is neceſſary.

In order to prevent the forceps from preſſing ſo much upon the ſtone as to be in danger of breaking it, ſome inventions have been propoſed for rendering the degree of preſſure employed by them ſteady and certain. Of thoſe the beſt ſeems to be what is repreſented in Plate XVIII, fig. 3. in which, as ſoon as a ſtone is laid hold of, it is preſerved in the ſame poſition by means of a ſcrew which paſſes from one of the handles into the other. During an operation, however, every incumbrance of this kind proves troubleſome, and there is not in fact the leaſt occaſion for ſuch an improvement: For, when a ſtone is ſmall, no ſurgeon of experience will apply great force in the extraction of it; and when it is very large, it will be more for the patient's advantage that it ſhould be broke than extracted entire.

We have already had occaſion to ſpeak of the great riſk which occurs from the extraction of ſtones of a large ſize: Indeed, this, as we have ſaid, is ſo conſiderable, as to warrant this concluſion, that cæteris paribus, the hazard attending the operation of lithotomy may be conſidered as correſponding to the ſize of the ſtone to be extracted. In healthy ſubjects, when the ſtone is ſmall, and when the operation is properly performed, there does not above one die in twenty: But, although a few inſtances have occurred of patients recovering from whom ſtones have been extracted of a large ſize, yet whenever the ſtone exceeds ſeven or eight ounces in weight, ſo far as I am able to judge, not above one in ten recovers.

This, therefore, is a moſt material circumſtance, and worthy of our moſt ſerious attention; and although the breaking of a ſtone, in the courſe of extraction, is in other reſpects rather diſagreeable, yet, with a view to obviate the dreadful conſequences which commonly enſue from tearing out a very large ſtone, when

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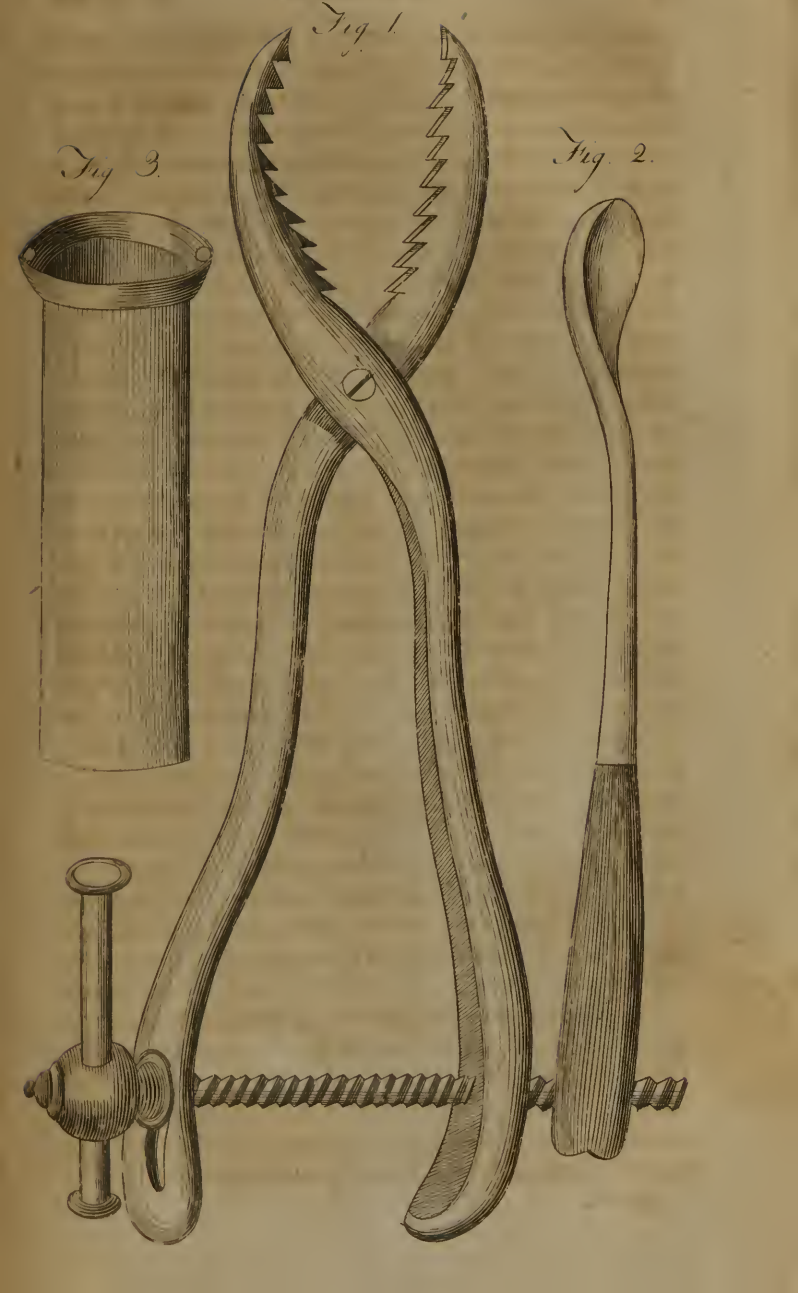
in the courſe of an operation it is found that the ſtone is of an uncommon magnitude, and that it cannot be extracted but with great hazard to the patient, Might it not be more eligible, either to endeavour to break the ſtone with the forceps already introduced, or to withdraw theſe and to introduce an inſtrument repreſented in Plate XVII, fig. 1. originally invented for this purpoſe by Andreas à Cruce, and ſince improved by Le Cat and others? By means of the long and ſtrong teeth with which theſe forceps are furniſhed, and eſpecially by the intervention of the ſcrew for compreſſing their handles, almoſt any ſtone may be broken into very ſmall pieces; and as ſoon as this is effected, the different pieces may be extracted with the common forceps.

In ſuch circumſtances, however, or when a ſtone has broke by accident in the courſe of any operation, the utmoſt care is neceſſary in order to extract every fragment of it; for, if the ſmalleſt particle be left, if it be not afterwards waſhed off with the urine, it may prove very prejudicial, by ſerving as a nucleus for the formation of another ſtone. After all the larger pieces have been extracted by the forceps, a ſcoop, ſuch as is repreſented in Plate XVII, fig. 2. is ſometimes found ſerviceable for taking out the ſmaller particles; but for this laſt purpoſe nothing ever proves ſo effectual as injecting, either with a ſyringe or a bag and pipe, large quantities of warm water, which, when a proper heat and a due degree of force are attended to, may be thrown in without injury, and it commonly proves very effectual for the purpoſe for which it is employed.

When a ſtone is extracted with a ſmooth poliſhed ſurface, it is commonly ſuppoſed that there will be others remaining in the bladder, as this ſmoothneſs is imagined to be owing to the friction produced by other ſtones; and, on the contrary, a rough unequal ſurface is ſuppoſed to denote the exiſtence of one ſtone only.

Plate XVII.



only. No dependence, however, ought to be placed upon theſe circumſtances; for every practitioner muſt have met with inſtances of a ſingle ſtone with a ſmooth ſurface; and, on the contrary, a ſtone of a rough unequal ſurface has been found where there have been more than one in the bladder. As ſoon, therefore, as one ſtone is extracted, the operator, inſtead of truſting to any appearances of the ſtone, ought firſt to ſearch with his finger, and then, either with the forceps, or with the thick curved inſtrument repreſented in Plate XV, fig. 3. which may be termed a ſearcher, and which anſwers the purpoſe better; and as long as any ſtones are diſcovered, the forceps are to be repeatedly introduced till the whole are entirely extracted.

In the courſe of this operation, ſome blood veſſels are unavoidably divided; but when the inciſion is kept as low down in the perinæum as we have directed, and when therefore the bulb of the urethra is avoided, there is ſeldom much riſk to be apprehended from any hemorrhagy that enſues. It now and then happens, however, that thoſe branches of the internal iliac artery which ſupply the parts lying anterior to the proſtate gland, are ſo conſiderable as, when divided, to pour out a good deal of blood: But as a free diſcharge during the operation has a conſiderable influence in preventing inflammation, a ſymptom which is more to be dreaded than any other occurrence ſubſequent to lithotomy, nothing in general ſhould be done to put a ſtop to the hemorrhagy till the ſtones are all extracted; when, if the diſcharge ſtill continues, any divided artery that appears ought to be ſecured by ligatures; and if the external inciſion has been made large and free in the manner we have directed, this is a part of the operation by no means ſo difficult as is commonly imagined. On different occaſions, I have paſſed a ligature upon an artery almoſt as deep as the proſtate gland; and when a large veſſel has been cut, the advantage derived from this ef-

fectual method of ſecuring it, is of itſelf a very important argument for making the external inciſion in every inſtance very free and extenſive.

When, however, the divided veſſel cannot be ſecured by ligature, we are then to endeavour to ſtop the hemorrhagy by preſſure; and for this purpoſe a firm roller introduced at the wound would anſwer very effectually: But in order to avoid any ſtoppage to the flow of urine, inſtead of a ſolid roller a ſilver canula covered with ſoft linen may be employed with advantage; a figure of ſuch an inſtrument is repreſented in Plate XVIII, fig. 3. Notwithſtanding, however, every precaution, ſome of the deep ſeated arteries, which have been divided hy the operation, continue ſometimes to pour out a great deal of blood, and which, inſtead of paſſing off by the wound, is, on ſome occaſions, collected in great quantities in the cavity of the bladder. As ſoon as this is perceived, ſome means ought to be attempted for its removal; and the moſt effectual of theſe are, to extract as much of the coagulated blood as poſſible, by a proper uſe of the ſcoop already mentioned, and afterwards by the frequent injecting of warm water by the wound, to waſh off the remainder. In this manner very large collections of blood have been evacuated; and when, as has ſometimes happened, means of this kind have not been employed, the coagulum in the bladder has at laſt become ſo firm, and has filled up the cavity of that viſcus ſo effectually, as to prevent entirely all further depoſition of urine. In ſuch inſtances the abdomen becomes pained and much tumefied; the fever gradually increaſes; and death itſelf very commonly ſucceeds.

With a view to prevent ſuch an unfortunate occurrence with as much certainty as poſſible, every patient ſhould, immediately after the operation of lithotomy, be placed in ſuch a poſture as moſt effectually to evacuate any blood that may be diſcharged:

Inſtead

Inſtead of laying the head low, and the buttocks high, as is commonly done, the pelvis ſhould be conſiderably lower than the reſt of the body; by which means the wound is kept in a depending poſture, which ſerves to aſſiſt the evacuation of any blood that the divided arteries may throw out. As ſoon as any flow of blood that has occurred is ſtopt, the patient ſhould be untied, and a piece of ſoft lint being inſerted between the lips of the wound, the thighs ſhould be laid together, and in this poſition he ſhould be carried to bed; and a conſiderable doſe of laudanum being adminiſtered, he ought for ſome time to be left entirely to the charge of the nurſe in attendance. No dreſſing whatever anſwers ſo well as a piece of dry ſoft lint: For as the urine is conſtantly running off by the wound, and as the parts are thereby kept very wet and are apt to fret, it becomes neceſſary to renew the dreſſings very frequently; and nothing is either more eaſily applied or removed than a piece of dry lint.

When the ſtone has not been difficult to extract, the patient generally remains eaſy, and free from much pain; and he frequently falls into reſt, and procures ſome ſleep during the firſt three or four hours after the operation: But when the ſtone is large, and when much violence has been done to the parts in extracting it, a ſevere pain in the under part of the abdomen often ſupervenes in the ſpace of an hour or two from the operation; and this, we muſt obſerve, when it does not ſoon yield, is one of the moſt alarming ſymptoms which occur. If it is merely of a ſpaſmodic nature, however, which in ſome inſtances it appears to be, it is commonly ſoon removed by the uſe of warm fomentations to the belly, or by emollient and eſpecially by anodyne injections thrown up by the rectum.

When by a continuation of theſe remedies the pain is found to abate, little or no anxiety need be entertained on account of it; but when, inſtead of becoming

ing leſs violent, it proceeds to increaſe, and eſpecially when the abdomen becomes hard and tumefied, and the pulſe full and quick, and when theſe ſymptoms continue to be aggravated, much danger is to be dreaded. As they almoſt conſtantly originate from inflammation, blood ought to be taken in quantities proportioned to the violence of the diſorder; emollient injections ought to be continued; and if the local application of heat to the abdomen, either by warm flannels, or by warm water contained in a bladder, is not found to anſwer, the patient ſhould be immediately put into the ſemicupium. Indeed, in ſuch circumſtances, I have experienced more advantages from this than from any other remedy; for the heat is not only applied with more effect directly to the parts affected, but a free diſcharge of urine by the wound is alſo more commonly procured by this than by any other means, and accordingly much relief is often obtained from it.

A due continuation of theſe means, with a proper uſe of opiates, a low diet, and a free uſe of diluent drinks, will frequently remove very alarming ſymptoms. But, in ſome inſtances, all our efforts prove ineffectual; the pain and tenſion of the abdomen continue to increaſe; the wound, inſtead of putting on a kindly healthy appearance, remains ſloughy and illconditioned; the quickneſs of pulſe, and other ſymptoms of fever, increaſe; and death cloſes the ſcene. But, when matters terminate happily, the wound by degrees acquires a healthy aſpect: The urine, in ſome inſtances, paſſes by the urethra from the beginning; but in moſt caſes it comes away by the wound for the firſt two or three weeks: The pain in the abdomen gradually abates; and any ſymptoms of fever which at firſt prevailed, are in a ſhort time entirely removed.

The period at which a complete cure of the wound is effected, is exceedingly various, and depends much

on

on the ſtate of health the patient is in: In ſome few caſes of young healthy boys, I have known the wound completely cicatriſed in leſs than three weeks; but in others this is not accompliſhed till the ſixth, ſeventh, or eighth week. Unfortunately, in ſome inſtances, again, although a great part of the ſore heals perhaps quickly enough, yet a ſmall opening is left at which the urine continues to be diſcharged, and, the edges of the paſſage becoming callous, a real fiſtulous opening is produced, which cannot be cured but by another operation; the manner of performing which we ſhall preſently have occaſion to mention. Indeed the prevention of fiſtulous openings depends much on proper attention in dreſſing the wound. If care be taken to introduce the lint ſufficiently within the lips of the wound till granulations fill up the bottom of the ſore, there will ſeldom be any riſk of fiſtulous ſores: At the ſame time, however, the wound ought not to be much crammed, either with lint or with any other dreſſing; for in this caſe the edges muſt either inflame, or acquire a morbid degree of hardneſs. In other reſpects the treatment here ought to be nearly ſuch as is known to anſwer in ſimilar wounds in other parts. It is proper, however, to obſerve, that nothing removes ſo effectually that excoriation of the buttocks, which ſometimes proves very troubleſome after the operation, from their being kept conſtantly wet with the urine, as their being frequently waſhed either with brandy or any other ardent ſpirit, or with lime water.

In patients of a weak, feeble conſtitution, an incontinence of urine frequently occurs after the operation of lithotomy. In general, however, this is removed upon the patient recovering his former degree of ſtrength; and the uſe of the cold bath, Peruvian bark, and a nouriſhing diet, contribute much to this effect. But, in order to obviate the immediate diſagreeable effects of a conſtant diſcharge of urine, different inſtruments

ſtruments have been contrived: Some of theſe have in view the compreſſion of the penis, in order to prevent the urine from being diſcharged; and others are intended to be concealed within the patient's breeches, and to ſerve as receptacles for the urine on its paſſing from the urethra.

In Plate XIX, fig. 1. is repreſented the moſt convenient form of the former of theſe; and in fig. 2, is delineated a receiver, which by experience has been found to anſwer the purpoſe of the latter both eaſily and effectually. And theſe inſtruments, it is obvious, may be uſed in all caſes of incontinence of urine, whether originating from this operation or from any other cauſe.

Hitherto we have been ſuppoſing the operation to take place in a male ſubject only; but although the ſhortneſs and width of the urethra in women renders them much leſs liable to ſtone in the bladder than men, yet inſtances frequently occur of this diſorder in females; and whenever it does ſo, and when the ſymptoms produced by it are violent, ſome means muſt be employed for relief.

While from the ſhortneſs of the urethra women are leſs liable to the ſtone than men, the operation of lithotomy with reſpect to them, is, on the ſame account, much more ſimple, and of courſe more eaſily performed. It cannot be done by cutting from the perinæum, in the ſame manner as in male ſubjects; for, as the urethra and bladder lie immediately above the vagina, any opening made into them from the perinæum muſt of neceſſity paſs through the vagina, ſo as to wound it both above and below: And this was conſidered as a very material objection to the lateral method of cutting, upon its firſt introduction. There is not here, however, the leaſt neceſſity for doing any injury to the vagina, as the urethra may be divided from one extremity to the other, without any riſk of touching it.

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The patient being placed upon a table, and secured in the manner we have already directed, a grooved staff, such as is represented in Plate XIV, fig. 3. is to be introduced into the bladder, by passing it through the urethra which lies between the nymphæ immediately below the clitoris; and the operator, keeping it firm with his left hand, is with his right to introduce the beak of the cutting director into the groove, and to run it easily along till it has fairly entered the bladder. He ought now, as in male subjects, to introduce his finger along the director; and having discovered the stone, should proceed to extract it in the manner we have already recommended.

By the old method of cutting in females with the greater apparatus, no incision was made into the urethra, but different instruments were used for the purpose of dilating it; and when this was supposed to be sufficiently effected, the forceps were employed for extracting the stone. In this manner, however, much laceration was produced; the patient suffered a great deal of unnecessary pain, and the bladder was commonly deprived of all power of retention. We have no difficulty, therefore, when operating on female subjects, in preferring the method we have recommended, of laying the urethra open through its whole length.

As the bladder in females lies immediately above, and quite contiguous to, the vagina, it has been proposed, that, instead of laying open the urethra, as we have directed, an opening should be made directly into the bladder from the vagina, at which the forceps are to be introduced for extracting the stone. One case of this kind we find recorded by Bussiere*; and, more lately, other three are related by the ingenious Mr. Gooch, in which this method of extraction was successfully employed†. It has never, however, been generally

* Philosophical Transactions for the year 1669, p. 106.

† Vide Cases and Remarks in Surgery, vol. ii. p. 182. by Benjamin Gooch.

generally adopted; and as various objections occur to it, we do not think it will ever be frequently put in practice.

By cutting into the bladder through the vagina, parts are injured, which by the other method may be avoided: The ſtone, when it does not lie directly upon the vagina, is with difficulty laid hold of; it cannot be ſo eaſily extracted as when drawn along in the courſe of the urethra; fiſtulous openings muſt in all probability occur more frequently after this than after the other method of operating; and if the woman ſhould afterwards become pregnant, the cicatrix formed in the vagina would produce pain, obſtruction, and perhaps laceration in the time of delivery.

One great advantage which the lateral operation, in its improved preſent ſtate, poſſeſſes over the others, both in males and females, is, that no laceration whatever is produced by it unleſs the ſtone is remarkably large; in which caſe, no precaution with which we are acquainted has any influence in preventing it: But, in ordinary caſes, where the ſtone is not large, if the parts are divided in the free manner we have recommended, all the riſk attending laceration, and which we have endeavoured to point out as the moſt hazardous part of this operation, is very effectually avoided.

We have thus deſcribed the various means, hitherto employed by practitioners, for extracting ſtones from the bladder; and from what has been ſaid, it muſt readily appear, that the lateral operation is, in ordinary caſes, greatly preferable to every other. Indeed it ſtands ſo eminently ſuperior to the others for general uſe, that we do not conſider it as neceſſary to draw any farther compariſon between them; but, as we have already obſerved, particular caſes do ſometimes occur in which the high operation may with great propriety be employed inſtead of it. We have already in ſtrong terms pointed out the riſk which occurs

curs from extracting a large ſtone by the lateral method of cutting; and we have ſhown, that ſtones of any magnitude which the bladder can contain may be extracted by the high operation. Whenever, therefore, it is known with any tolerable certainty, that a ſtone is of an uncommon ſize, and when the high operation is in other reſpects admiſſible, it ought certainly in every ſuch inſtance to be preferred: For although in caſes of large ſtones it may be better to break them into ſmall pieces in the manner we have directed, than to lacerate the parts by extracting them entire; yet this practice is only adviſable when the operator unexpectedly meets with a large ſtone after the bladder has been cut into: And whenever it happens otherwiſe, and the ſtone is previouſly known to be very large, much advantage may accrue to the patient from a judicious choice, on the part of the operator, of his method of operating.

In the directions here laid down for performing the lateral operation, the dictates of experience are ſtrictly adhered to, and nothing is recommended that is not either at preſent very generally adopted, or that I have not myſelf put in practice.

Many ingenious propoſals have been made by individuals for the improvement of the operation of lithotomy, particularly of the lateral method of cutting: But a minute detail of all that has been ſuggeſted upon this ſubject, is incompatible with the nature of this work; nor could it ſerve any purpoſe, but to bring into view ſome particular modes of practice, which were either never generally followed, or which, if adopted, have fallen again into diſuſe.

The moſt remarkable of theſe propoſed improvements of the lateral operation are, thoſe of three French ſurgeons, Monſieur Foubert, Monſieur Thomas, and Frere Coſme. The two firſt of theſe gentlemen invented inſtruments for penetrating the body of the bladder without interfering with the urethra. The

bladder being diſtended with urine, and an inciſion being made through the ſkin and cellular ſubſtance, a cutting inſtrument of a particular conſtruction is then directed to be puſhed paſt the urethra into the ſide of the bladder; and an opening being made of a ſufficient ſize, the ſtone is to be extracted in the uſual manner. One material advantage propoſed from this improvement is, that by the urethra and proſtate gland being avoided, that inability to retain the urine and other troubleſome conſequences, which ſometimes enſue from injuries done to theſe parts, are not ſo apt to occur when the body of the bladder alone is wounded. But, independent of any other objection to which this method of operating is liable, this of itſelf muſt ſerve effectually to prevent it from being ever very generally received, namely, the wound in the bladder being ſure to recede from the wound in the teguments as ſoon as all the water contained in it is evacuated: And the conſequences reſulting from ſuch an occurrence muſt frequently, it is obvious, prove very diſtreſſing; as the urine, by not finding a free paſſage by the wound, will readily inſinuate itſelf into the contiguous parts, where it muſt of conſequence be productive of very troubleſome fiſtulous openings.

So that although this method of cutting directly into the neck or body of the bladder, is, at firſt view, extremely plauſible, yet the leaſt reflection on theſe conſequences which frequently reſult from it, muſt at once convince every practitioner of the riſk attending it being conſiderable.

The operation of Frere Coſme, is, in effect, the ſame with the real lateral operation, as it is now commonly practiſed. The parts cut in it are exactly the ſame, only they are divided in a different manner. After the ſtaff is laid bare in the uſual manner, the beak of the inſtrument, fig. 1. Plate XVIII, is introduced into the groove; and being puſhed forward till it reach-

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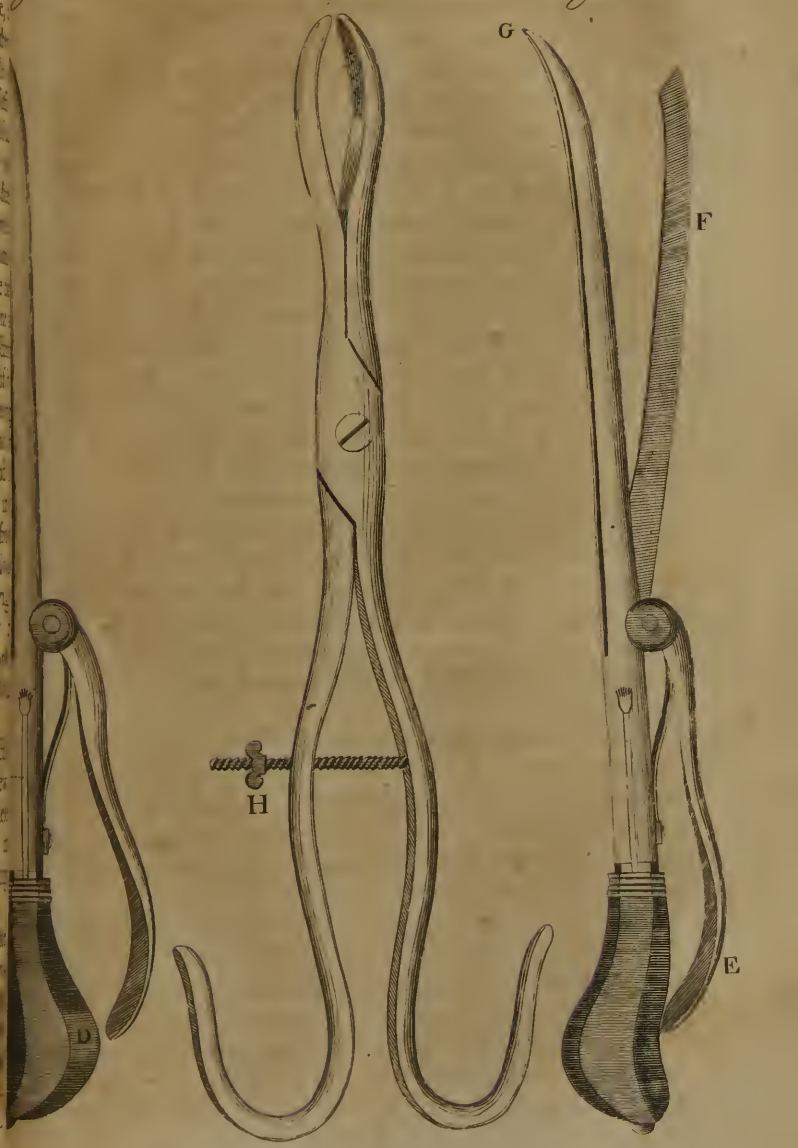
Plate XVIII.

Fig. 1

Fig. 3

Fig. 2



es the bladder, the ſpring C is then to be preſſed down, ſo as to raiſe the knife from its ſheath, when the operation is to be finiſhed by withdrawing the inſtrument in ſuch a direction as may divide the neck of the bladder and proſtate gland in the ſame manner as is done by the common gorget: After this, the other ſteps of the operation are to be completed in the manner we have already directed, by the forceps alone.

Moſt of the other deviations from the eſtabliſhed mode of practice, hitherto propoſed by ſurgeons, conſiſt, either in ſome improvement of the cutting gorget of Mr. Hawkins, or in a preference which ſome practitioners ſtill continue to give to the knife. We have already obſerved, that Mr. Hawkins's gorget does not ſpread ſufficiently at the cutting part of it; and that it is much wider and deeper backwards than it ought to be, by which it is liable to tear and otherwiſe injure the urethra more than is neceſſary: This inconvenience, however, we think is effectually removed, by the cutting director we have ventured to recommend.

With reſpect to the ſcalpel being preferred by ſome operators both to the cutting gorget and director, we have only to obſerve, that an expert ſurgeon of ſteadineſs, and poſſeſſing a minute knowledge of the anatomy of the parts, may with eaſe and ſafety perform the operation of lithotomy with the knife alone; but we muſt alſo remark, that, with the generality of ſurgeons, the danger of wounding the rectum is ſo great when the ſcalpel is employed, that the uſe of the gorget or cutting director, by either of which the inteſtine is effectually defended, ought to be commonly preferred.

In the courſe of this Section we have endeavoured to deliver all that is worth recording, of modern practice in the operation of lithotomy: We are not conſcious of having omitted any improvements of importance; and ſome, we hope, are propoſed, which are

not

not generally known, or which, if known, are not commonly practiſed.

As the ſubject we are treating of is one of the moſt material in the department of Surgery, we have been induced to extend the conſideration of it to a very conſiderable length: It may therefore prove ſerviceable, to ſtudents eſpecially, to have ſuch circumſtances enumerated in a more conciſe manner as particularly merit their attention.

1. We have already in ſtrong terms pointed out the propriety of an abſolute certainty being attained, of a ſtone exiſting in the bladder, before the operation of lithotomy is propoſed: And we have endeavoured to ſhow, that no ſymptoms, however ſtrongly marked, afford ſufficient evidence of the preſence of calculus; the operation of ſounding, or touching the ſtone with a ſtaff, being the only certain means we have of judging of this matter.

2. In performing this operation, a conſiderable quantity of urine ought to be previouſly allowed to collect in the bladder; the rectum ſhould be emptied by an injection; the buttocks ought to be conſiderably elevated above the reſt of the body; and the external inciſion ought to be more extenſive than is commonly adviſed. In full grown adults, inſtead of an inch and a half, or two inches, as it is generally made, it ſhould be at leaſt three inches and a half long; care being taken to commence the cut at the inferior edge of the pubes, and to continue it in an oblique direction till it has paſſed the anus, at an equal diſtance between the extremity of the rectum and the tuberoſity of the iſchium.

3. As the great reſiſtance frequently experienced in this operation to the extraction of the ſtone, proceeds moſt commonly from the muſcles covering the urethra, theſe ought to be freely divided: No danger can enſue from this, and much advantage may be derived from it.

4. But

4. But although a free diviſion of the muſcles is of much importance, there is no neceſſity for cutting ſo much of the urethra as is very commonly done: It does not render the extraction of the ſtone in any degree eaſier; and it makes the operation more hazardous than when the membranous part of the urethra only is divided. When the inciſion is carried through the teguments and muſcles ſo as to leave the ſtaff covered by the urethra only, the operator ought to inſert the index and middle finger of his left hand into the bottom of the wound, by which means the rectum will be effectually protected; and this being done, an opening ſhould be made into the urethra by piercing it with the point of the ſcalpel very near to the proſtate gland, and extending the inciſion to the bulb, but no farther. This, we may remark, ſhould be done by one ſtroke of the knife; and not by repeated applications of it as is the common practice, for by this means a rugged unequal wound muſt for certain be produced. In the firſt part of the operation, the point and edge of the knife ought to be ſo applied as to cut from above downwards, as in this manner the inciſion is very eaſily and ſafely accompliſhed; but in dividing the urethra, the back of the knife ought for certain to be turned down, while the edge of it is made to penetrate the urethra, and to run along the ſulcus of the ſtaff. By this means the rectum cannot poſſibly be injured; an occurrence, which, in the uſual method of operating, is too frequently met with.

5. The next ſtep in this operation is to divide the proſtate gland, with a very ſmall portion of the neck of the bladder. This, we have obſerved, may be done with much ſafety and eaſe with the ſcalpel alone, by a good anatomiſt, whoſe hand is perfectly ſteady; but as there is a neceſſity for dividing the proſtate gland in ſuch a direction as to avoid the rectum, with which it is poſteriorly connected, and likewiſe the excretory ducts of the veſiculæ ſeminales which termin-

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ate here, much exactneſs is required to get this accompliſhed, and it can only be done with ſafety to theſe parts by a lateral cut through this gland. A very ſmall variation, it is evident, in the direction of the ſcalpel, might here be productive of much danger; and few practitioners being poſſeſſed of ſuch equal ſteadineſs as at all times to be able to avoid this, for ordinary practice, a knife, conſtructed in ſuch a manner as to protect the rectum and other parts behind, at the ſame time that it effects a lateral diviſion of the gland, ought certainly to be preferred. The gorget of Mr. Hawkins is attended with all theſe advantages; but we have formerly ſhown, that it is likewiſe attended with a very material inconvenience. This, we think, is effectually obviated by the cutting director we have already deſcribed, which makes a more clean and ample cut than the gorget, at the ſame time that it does not tear the urethra, as the gorget always does by being made to expand more behind than is neceſſary.

6. After the ſtone is laid hold of by the forceps, it ought to be extracted in a very ſlow and gradual manner; not by a rotatory motion, or by preſſure applied equally in all directions; but by endeavouring to dilate the parts along the courſe of the wound in a line directly between the anus and the tuberoſity of the iſchium. Moderate preſſure laterally, may likewiſe have ſome influence: But no force ought ever to be applied towards the upper part of the wound; for nothing can be gained by doing ſo, and it muſt for certain do miſchief by preſſing the urethra with violence againſt the pubes. When in the courſe of extraction it is found, that the paſſage of the ſtone is impeded by ſome of the muſcles not having been ſufficiently divided, this ought ſtill to be done, by the operator keeping the ſtone firm in the forceps with one hand, while with a ſcalpel in the other he effects what is neceſſary.

7. The

7. The ſtone being extracted, ſoft eaſy dreſſings ſhould be applied to the wound: And the patient ſhould be laid in bed with his head and upper part of the body elevated, in order to facilitate the evacuation of any blood that may be diſcharged from any arteries that have been cut; and which, by a contrary poſture, with the buttocks raiſed above the reſt of the body, is often made to lodge in the bladder, to the great detriment and even hazard of the patient.

Having thus enumerated thoſe points in this operation which deſerve moſt attention, we ſhall now proceed to conſider the operation of Nephrotomy.

SECTION VIII.

Of Nephrotomy.

WHEN one or more ſtones are impacted in the kidneys, in ſuch a manner as to be prevented from paſſing off with the urine, they give riſe to a train of ſymptoms which occaſion the moſt complete miſery during the life of the patient, and which at laſt almoſt conſtantly terminate in his death.

The ſeverity of the pain produced by ſtones in the kidney, is frequently ſo great, as to have induced practitioners to ſuggeſt an operation for extracting them. This conſiſts in a cut being made through the common teguments and muſcles immediately above the kidney, with an opening into the kidney itſelf of a ſufficient ſize to afford a free paſſage for the ſtone.

But we are to remember, that, however marked the ſymptoms of a ſtone in the kidney may appear to be, it is impoſſible to obtain an abſolute certainty on this point. We know that a ſtone in the kidney occaſions pain in the region of the kidney, together with ſickneſs and vomiting, and a diſcharge of urine ſometimes mixed with blood, and on other occaſions with

with mucus, and even with purulent matter. We alſo know, however, that the ſame ſymptoms are not unfrequently induced by other cauſes, particularly by inflammation and conſequent ſuppuration of the kidney. Many inſtances have occurred of the moſt violent nephritic complaints ſubſiſting for a great length of time, where ſtones were ſuſpected as the cauſe of them; but where, upon diſſection, inſtead of this the kidney has been found to be completely ſuppurated, and as it were entirely diſſolved, a quantity of purulent matter being contained within its external covering.

Even in the caſe of calculus of the bladder, a diſorder leſs ambiguous than the nephritis calculoſa, the ſymptoms are never ſo diſtinct and characteriſtic as to render the operation of lithotomy adviſable, unleſs a ſtone is diſcovered upon the introduction of a ſound. But in affections of the kidney, ſuſpected to originate from ſtone, we are deprived of this means of aſcertaining its preſence; ſo that it might not unfrequently happen, that, after laying open the kidney, no ſtone would be diſcovered. This is, therefore, an objection, and a very important one to the operation in queſtion.

But it is to be farther obſerved, that the kidneys do not lie near the ſurface of the body; that although they are not altogether covered by the inferior falſe ribs, yet theſe ribs project ſo much over them, as to prove a conſiderable obſtacle to an operation; and that, in people who are corpulent, the kidneys are very thickly covered indeed.

For theſe reaſons, it is impoſſible to make an opening into the kidney with ſo much accuracy and preciſion, as the near contiguity of the neighbouring large blood veſſels would require; and whoever attempts the operation of nephrotomy, even on the dead body, will find it a difficult matter to cut into the pelvis of the kidney without opening ſome of the large blood veſſels belonging to it: The very great

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and immediate danger from such an accident is too manifest to require to be farther mentioned.

When, indeed, the inflammation, frequently induced by a stone in the kidney, terminates in an abscess, and when the matter thus collected forms a tumor in which a fluctuation is distinguished, little or no danger can ensue from opening it: And in such an event the stone which produced the tumor will either be discharged along with the matter, or it may, if it can be laid hold of, be afterwards extracted with safety.

The stone being thus taken out, the opening through which it passed, will either heal by the usual means employed in the treatment of abscesses in other parts; or the most unfavourable termination that can probably happen, will be a fistulous sore, through which a mixture of pus and urine will continue to be discharged.

Upon the whole we may conclude, that when we are not directed by the apppearance of a tumor to the part which ought to be opened, the uncertainty of the ground upon which we proceed when we undertake this operation—the difficulty of performing it—and the very imminent danger which attends it, will more than counterbalance any advantage which can ever be expected to be derived from it; and that for this reason the operation of nephrotomy will never probably be received into general practice, however much it may be recommended by some writers, and warmly supported by others, who, in order to raise a reputation which they might not otherwise obtain, will sometimes step forward and propose with confidence what no practitioner of character would think right to attempt*.

* For farther information on the subject of Nephrotomy, see Rosletus de partu Cæsareo, cap. vii. sect. 4. Philosophical Transactions for the year 1696. Schenkius Observat. Med. lib. iii. Juncker's Conspect. Chirurg. tab. 93. Edinburgh Medical Essays. Memoires de l'Academie Royalle de Chirurgie of Paris.—And Mery's Observations sur la Maniere de Tailler.

SECTION IX.

Of Stones *in the* Urethra.

IT is not an unfrequent occurrence for patients liable to calculus complaints, to paſs ſmall ſtones along with their urine. When the ſtones, in ſuch inſtances, are ſmooth and not very large, they uſually come off with little or no difficulty; and in ſome caſes ſtones of a very conſiderable ſize have been paſſed without being productive of much pain. But when an angular or rough ſtone is puſhed into the urethra, if it is not ſo ſmall as to paſs eaſily off with the firſt flow of urine, it is ſure to create a great deal of diſtreſs.

Pain is the firſt ſymptom produced by a ſtone lodged in the urethra; and to this ſucceed inflammation, tumefaction of the parts, and always a partial and frequently a total ſuppreſſion of urine. In ſome inſtances, when the diſorder is long neglected, this ſuppreſſion and conſequent tumefaction terminate in a rupture of the urethra; in conſequence of which, the urine eſcapes into the contiguous cellular ſubſtance, and very troubleſome ſwellings are produced not only in the body of the penis, but frequently in the ſcrotum, and through the whole courſe of the perinæum.

The treatment ſuited to ſuch tumors will be pointed out when we come to treat of fiſtulous ſores in theſe parts; we have now only to relate the eaſieſt and moſt effectual means of diſcharging the ſtones which are lodged in the urethra. As ſoon as it is known that an obſtruction is formed in the urethra by the ſtoppage of a ſtone, the niceſt attention becomes requiſite in order to procure its removal.

When a ſtone has been long fixed at one particular part without yielding in any degree, and when the pain and inflammation produced by it are conſiderable, a chirurgical operation ought to be immediately employed

employed for removing it; but in the incipient ſtages of this diſorder, other means of a more gentle nature ſhould be firſt put in practice.

Whether or not the urethra itſelf is poſſeſſed of any contractile power, is a point not eaſily to be determined: But the muſcles with which it is immediately connected, are in common with other muſcular parts ſubject to the influence of ſtimuli; and as nothing with which we are acquainted, can be ſuppoſed to give a more powerful ſtimulus to a ſenſible part than the irritation of a rough or angular ſtone, ſo we may fairly conclude, that when once a ſtone is impacted in the urethra, its farther paſſage along that canal may very poſſibly be impeded by a ſpaſmodic contraction of ſome of the contiguous muſcles. One very important indication, therefore, in the treatment of this malady, is, the removal of ſpaſm; and when we keep this idea in view, and continue to perſiſt in the uſe of proper remedies, we ſeldom fail to bring off ſuch ſtones as have been lodged in the urethra, without the aid of any chirurgical operation. But, inſtead of the application of means calculated for the removal of ſpaſm, the ordinary practice of ſurgeons is the direct reverſe of this, and muſt frequently be attended with a very oppoſite effect.

An attempt is commonly made to puſh the ſtone forward at once with the fingers. It is obvious, however, that until the ſpaſm which in part produces the obſtruction, is removed, every trial of this kind will rather tend to increaſe the complaint. For this reaſon, therefore, no preſſure ought to be uſed till the moſt effectual means have been employed for removing the ſpaſm produced by the ſtone. With this view, the patient, if he is plethoric, ought to loſe a conſiderable quantity of blood by the lancet; or if he is thin and emaciated, a proportionable quantity ſhould be diſcharged by leeches, directly from the part affected. A quantity of warm oil ſhould be repeatedly

peatedly injected into the urethra, in order to lubricate the paſſage as much as poſſible.—The patient ſhould be immerſed in a warm bath—and a full doſe of laudanum ſhould be at the ſame time exhibited.

Together with theſe remedies, a plentiful uſe of diuretic medicines, and of diluent drinks, is commonly preſcribed; but, inſtead of being productive of any advantages, they almoſt conſtantly do harm. For, when the urine ruſhes out with violence, if it does not carry the ſtone freely out of the urethra, it will tend to fix it more firmly than before; and the pain thus produced, will always increaſe the inflammation, tenſion and ſpaſm of the parts affected: So that whatever has much effect in increaſing the quantity of urine ſhould be carefully avoided.

A proper quantity of blood having been diſcharged; the patient having remained for a ſufficient length of time in the warm bath; and the opiate having begun to operate; the parts will thus be as completely relaxed as poſſible: And this is the period when ſome attempt ſhould be made for extracting the ſtone. Various inſtruments have been contrived for this purpoſe, particularly long ſmall pliers or forceps concealed in a canula of a ſize correſponding to that of the urethra; but as none of theſe have ever proved in any degree uſeful, and as they often do much harm by producing an increaſed irritation in the urethra, we do not think it neceſſary to delineate them.

In place of uſing inſtruments of this kind, a ſurgeon ought at firſt to endeavour by very gentle preſſure to puſh the ſtone forward along the courſe of the urethra. In this manner large ſtones may be brought off, for the removal of which a very painful operation might otherwiſe be neceſſary. Indeed, ſtones of ſo very conſiderable a ſize have been ſometimes paſſed by the urethra, as ought always to induce practitioners to perſevere for a conſiderable time in the employment

ment of the more gentle remedies we have recommended, before adviſing any other means of relief.

It frequently happens, however, that ſtones of ſuch a ſize and figure get into the urethra, as cannot by any means be made to paſs to the extremity of that canal. When a ſtone, thus fixed in the paſſage, is of ſuch a form as to admit of the diſcharge of the urine, a patient, rather than ſubmit to an operation, is ſometimes induced to allow it to remain; and when he does ſo, the ſtone, in a ſhort time, commonly obtains an increaſe of ſize by a depoſition of earthy matter from the urine: I have known different inſtances of this in which the ſtones have become very large, and in which the urethra was ſo dilated as to form an extenſive pouch or cavity correſponding to the ſize and figure of the ſtone. But when the ſtone, inſtead of allowing any of the urine to paſs, fills up the urethra entirely, it then becomes neceſſary to have immediate recourſe to an operation as ſoon as the means we have already recommended are found to prove ineffectual.

This operation conſiſts in cutting directly upon the ſtone, and extracting it either with a ſcoop or with a pair of ſmall forceps; but the methods of effecting this vary according to, and depend upon, the part of the urethra in which the ſtone is fixed. When a ſtone is ſituated near to the beginning of the urethra, and very contiguous to the bladder, it has been adviſed to puſh it again into the bladder by means of a ſtaff: But as it might there probably acquire a much larger ſize, and would conſequently render the patient liable to all the diſtreſs uſually produced by a ſtone in the bladder, this is a practice which ought by no means to be admitted, as the ſtone may be extracted with much more eaſe from any part of the urethra, and with much leſs hazard to the patient, than is commonly incurred by the more formidable operation of cutting into the bladder.

When

When therefore, an operation is neceſſary for extracting a ſtone fixed in the urethra near the neck of the bladder, the method of performing it is this.

The patient ought to be laid upon a table, and ſecured in the manner we have directed for the operation of lithotomy: And an aſſiſtant ſuſpending the ſcrotum and penis, the ſurgeon, after oiling the firſt and ſecond fingers of his left hand, ſhould introduce them into the anus, and by means of them ought to preſs firmly upon the parts immediately behind the ſtone; which will not only enable him to lay it bare with more eaſe, but will be the ſureſt method of preventing it from being puſhed into the bladder by the neceſſary preſſure of the knife. This being done, an inciſion ſhould be made through the common teguments and urethra, ſo as to lay the ſtone completely bare; which may now be either turned out by a due degree of preſſure applied with the fingers in the rectum; or, if this is not found to be ſufficient, it may be taken out either with a ſcoop or with a pair of forceps.

The after treatment is the ſame here as we have directed in the operation of lithotomy.

When, again, a ſtone has paſſed farther into the urethra, in order to extract it the ſkin ought to be drawn as much as poſſible paſt it, either in a backward or forward direction; and the ſtone being now ſecured in its ſituation by preſſure, a longitudinal cut is to be made directly upon it through the urethra, of a ſufficient ſize to admit of its eaſy extraction either with the ſcoop or forceps. The edges of the wound are now to be completely cleared of ſabulous particles, and the ſkin allowed to regain its natural ſituation; by which means, if the operation has been properly done, the wound in the urethra will be entirely covered by ſkin that has not been injured: A circumſtance which tends to render this operation much leſs formidable than it otherwiſe would be; for the wound

in

in the urethra is thus ſo well protected, that it commonly heals by the firſt intention.

It ſometimes indeed happens, that in voiding urine, part of it eſcapes at the wound, and inſinuates itſelf into the contiguous cellular ſubſtance. This is, however, a rare occurrence, and the inconveniences ariſing from it are eaſily obviated by laying open any collection of urine which may take place during the cure.

When a ſtone fixes near to the point of the yard, as it ſometimes does; if it is ſo near as to be obſerved by the eye, it may frequently be taken out with a pair of ſmall diſſecting forceps: And in order to facilitate the extraction, when it cannot be otherwiſe effected, the urethra may be ſomewhat dilated from its extremity with the point of a ſcalpel. But when we fail of ſucceſs in this way, an inciſion muſt be made upon the ſtone in the manner we have directed where the urethra is covered with ſkin. Soft dreſſings ſhould be applied to the wound; and when the cure is nearly completed, a hollow bougie, a ſhort ſilver tube, or a ſmall catheter of the elaſtic gum, ſhould be introduced into the urethra, in order to preſerve it of a proper ſize.

The moſt perplexing ſituation in which a ſtone can be fixed in the urethra, is juſt below the ſcrotum; for if the ſtone either makes its way into the ſcrotum, or if it is neceſſary to make an opening into it with a ſcalpel, ſuch large collections of urine are apt to occur, as commonly occaſion much diſtreſs.

In order, therefore, to obviate this inconvenience, as ſoon as a ſtone is diſcovered in this ſituation, the greateſt attention ought to be given, either to get it carried farther into the urethra, or, if this cannot be effected, to puſh it back into the perinæum by means of a ſtaff. By a due perſeverance in the means we have recommended, this will very commonly be effected: But when it is found to be impracticable, and

that

that there is a neceſſity for extracting the ſtone, an inciſion muſt be made into the urethra, by beginning the cut at the under part of the ſcrotum immediately to one ſide of the ſeptum, and continuing it upwards till the ſtone is diſtinctly felt, when it is to be laid bare and extracted in the manner we have already directed.

By making the inciſion from below upwards, any urine that eſcapes from the urethra finds a very free paſſage; and if the opening is made ſufficiently large, the ſtone may be in this manner eaſily extracted. During the operation, care muſt be taken to have the teſtis of that ſide on which the cut is made, as much protected as poſſible, by an aſſiſtant pulling it away from the knife; and when this is properly done, there is no danger of the teſticle being injured. Some attention is neceſſary after the operation in applying the dreſſings in ſuch a manner, that the ſore may heal firſt at the bottom; for if this circumſtance be not kept in view, and if the teguments are allowed to heal before every vacancy in the parts beneath is filled up, purulent matter, and perhaps urine, will very probably be collected, and may thus give riſe to troubleſome ſinuſes.

When urine continues to be diſcharged for any length of time at a preternatural opening of the urethra, whether the conſequence of the operation of lithotomy or of any other cauſe, if the calculous diatheſis prevails, ſtones of a large ſize will frequently form in the cellular ſubſtance contiguous to the opening. I have met with ſeveral inſtances of this: In ſome of them, the ſtones were ſmall and eaſily extracted; but in others they were found to occupy a conſiderable portion of the cellular membrane, and to occaſion a good deal of trouble in taking them entirely out*. The treatment here conſiſts ſolely in making

* A very remarkable caſe of this nature is recorded by Gooch. See Caſes and practical Remarks in Surgery, Vol. ii, p. 174, by Benjamin Gooch.

ing a free inciſion along the courſe of the calculous concretions; in turning them out, either with a ſcoop or a pair of forceps; and in dreſſing the wound properly, ſo as to induce a firm adheſion of the parts beneath, before the external teguments are allowed to heal.

In females, the urethra is ſo ſhort, and dilates ſo readily, that ſmall ſtones ſeldom ſtop in it: They are moſt commonly carried off by the flow of urine which brings them into it; but when they happen to fix in it, they are commonly turned out with much eaſe, merely by the end of a blunt probe being inſinuated behind them, and then pulled forward: Or, when this does not ſucceed, it may always be effected with ſafety, by cutting open the extremity of the urethra ſo far as to admit of the introduction of a pair of ſmall forceps by which the ſtones may be extracted.

CHAP. XII.

OF INCONTINENCE OF URINE.

INCONTINENCE of urine may be produced by various cauſes; but as it is frequently connected with calculous complaints, and is in ſome inſtances the conſequence of the operation of lithotomy, we are hence induced to take the ſubject under conſideration in this place.

The ordinary cauſes of this malady may be reduced to the following heads.

1. Irritation about the neck of the bladder, produced by the friction of ſtones contained in it. Thus we know, that inability to retain urine, is a very frequent ſymptom of ſtone in the bladder; and we cannot ſuppoſe this to proceed from any other cauſe than the conſtant ſtimulus communicated by the ſtone to the coats of the bladder. For, if it always originated, as has been ſuppoſed, from a total loſs of power in the ſphincter viſicæ, the diſeaſe would ſeldom or never admit of a cure. But we know well, that an incontinence of urine, depending upon a ſtone in the bladder, is very commonly removed entirely by the operation of lithotomy: And we likewiſe know, that it is very frequently much relieved, even when the ſtone remains in the bladder, by the uſe of thoſe remedies which moſt effectually remove irritability; particularly by a plentiful uſe of mucilaginous drinks, and by a free uſe of opiates. Indeed, by a continued uſe of theſe remedies, this variety of the diſeaſe is commonly more effectually removed than by any other means,

means, extraction of the ſtone excepted; which, when theſe fail, is to be kept in view as the only reſource upon which we are to depend.

2. A conſtant ſtillicidium, or incontinence of urine, is a frequent conſequence of paralytic affections; and it would appear, that the ſphincter of the bladder now and then loſes its contractile power, while the natural tone of its body, or of the muſcle termed Detruſor Urinæ, remains entire. In this variety of the diſorder, the obſtinacy of the paralytic affection with which the conſtitution in general may be attacked, commonly renders fruitleſs every attempt to remove it. But the moſt obvious remedies to be employed for it, are, tonics, particularly Peruvian bark, chalybeates, and eſpecially the cold bath general and local. In every affection of this kind, the local application of cold to the perinæum has more influence than any other remedy. Cloths wet with vinegar and cold water, or with a ſtrong ſolution of ſaccharum ſaturni in vinegar, are ſometimes of uſe; but the moſt effectual method of applying cold, is by daſhing water directly from the fountain upon the perinæum and fundament.

3. An incontinence of urine is not an unfrequent conſequence of laceration produced in the operation of lithotomy in male ſubjects; and in the ſame operation, and by violence done to the parts in delivery, in females. It ought to be remembered, however, when in the lateral operation of lithotomy much laceration is produced, that in general it proceeds from the muſcles and other parts not having been freely enough divided by the knife: And accordingly, except in caſes of exceeding large ſtones, this inconvenience of an incontinence of urine ſeldom ſucceeds to this operation, when it is properly performed.

As the diſeaſe in this caſe depends upon nearly the ſame cauſe as the one laſt mentioned, namely, on a loſs of power in the retaining parts, the ſame remedies become

come neceſſary; and by a due perſeverance in the uſe of theſe, particularly of cold bathing, many are at laſt very effectually relieved from this ſpecies of the diſorder. But it does frequently happen, in every variety of the diſeaſe, that no relief is obtained from any remedy whatever; in which caſe it becomes an object of importance to prevent the urine from incommoding the patient, which it does in a very diſtreſſing manner, if ſome effectual means are not employed to guard againſt it.

When the diſorder proceeds from either of the two laſt mentioned cauſes, namely, from a paralyſis of the ſphincter of the bladder, or from laceration, compreſſion of the urethra anſwers very effectually for preventing any inconvenience produced by it, as the preſſure can be ſo modified as to be applied and removed at pleaſure. Nuck invented the firſt inſtrument for this purpoſe that we find any deſcription of. The Jugum, or Yoke, as it is termed, in Plate XIX, fig. 1. is an improvement upon this; and, when properly fitted, it anſwers the purpoſe exceedingly well. When lined with quilted ſilk or velvet, it ſits eaſily on the penis, and by means of the ſcrew the preſſure can be made of any degree of tightneſs. For women another invention becomes neceſſary, as the preſſure here muſt be applied through the vagina. Peſſaries of ſponge have been invented for this purpoſe; but, when the parts are not ſo irritable as to prevent the application of them, nothing anſwers ſo well as the ordinary peſſaries of ivory, or of any ſolid timber, ſuch as lignum vitæ. In Plate XX, are repreſented peſſaries of different ſizes.

In the introduction of theſe inſtruments, care ſhould be taken to have them very finely poliſhed, and they ſhould likewiſe be well covered with oil. After being fairly paſſed into the vagina, the peſſary ſhould be placed directly acroſs, ſo as to preſs with as much effect as poſſible againſt the urethra.

This

Plate XIX.

Fig. 1.

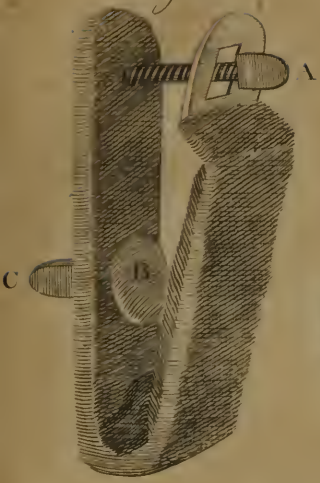

Fig. 2.

Fig. 3.

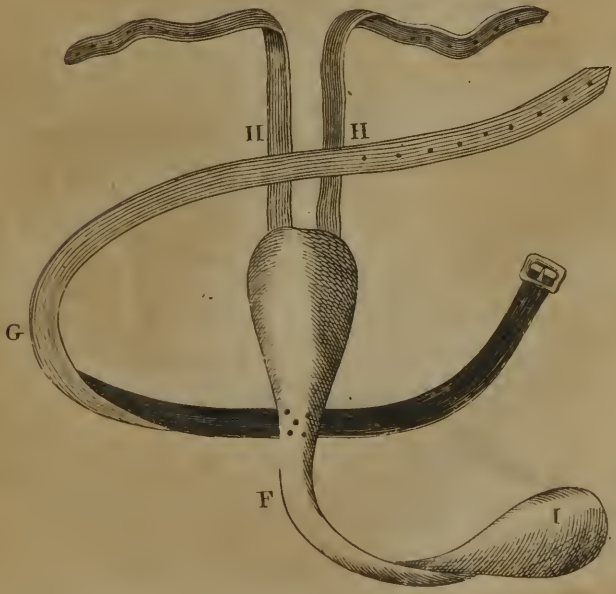

Plate XX.

Fig. 1.

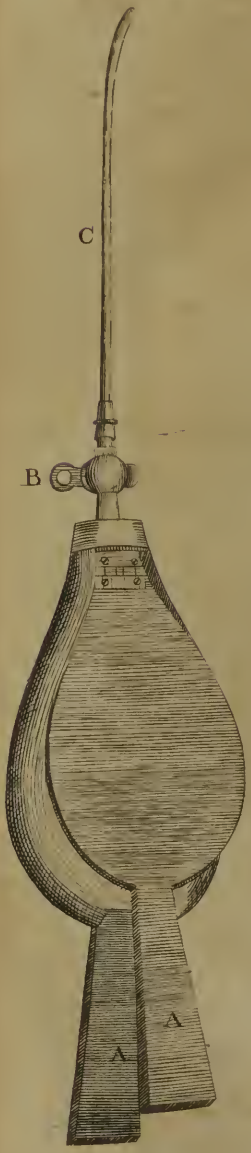

Fig. 2.

Fig. 3.

Fig. 4.

This method of obviating the inconveniences produced by an incontinence of urine, by preſſure, is not, however, applicable when the diſorder proceeds from irritation about the neck of the bladder; for the continual deſire to paſs water, with which patients in ſuch circumſtances are conſtantly tormented, renders every attempt to ſuppreſs a complete evacuation of it totally inadmiſſible. It is therefore a matter of importance, for practitioners to attend to the different cauſes by which the diſorder is produced; for here it is evident, that a remedy well calculated for one variety of the diſeaſe, may prove very prejudicial in the others.

In all ſuch inſtances where preſſure upon the urethra is found to be improper, much relief may be obtained by having a machine properly fitted to ſerve as a reſervoir for the urine. The inſtrument formerly referred to, repreſented in Plate XIX, has been uſed by different people, and with much advantage. It ought to be made ſo as to apply as cloſely as poſſible to one of the thighs; and, when properly fixed to a circular bandage round the body, it commonly remains ſufficiently firm, and at the ſame time admits of a change of poſture in any ordinary exertion of the body. Inſtruments of this kind, however, prove uſeful only in men. In women, all that can be done, is, to apply ſponge and ſoft linen in ſuch quantities as will effectually abſorb the urine as it paſſes off.

By one or other of the methods here pointed out, moſt of the inconveniences induced by this diſorder may be much obviated; and in courſe of time it frequently happens, that when the original cauſes which produced it are removed, the diſeaſe itſelf is at laſt completely cured.

CHAP.

CHAP. XIII.

OF A SUPPRESSION OF URINE.

THE diſorder treated of in the laſt chapter, namely, an Incontinence of Urine, is always attended with ſome inconvenience; but the diſeaſe now under conſideration, proves, in every inſtance, very alarming, and on many occaſions is productive of more real miſery than almoſt any other to which the human body is liable*.

Various cauſes tend to the production of this diſorder; and in the treatment of it, a nice diſcrimination of them is neceſſary.

1. In the preceding chapter we have ſeen, that an incontinence of urine is often produced by the ſphincter of the bladder becoming paralytic, while the detruſor urinæ ſtill retains its power of contraction. In a ſimilar manner, a ſuppreſſion of urine frequently occurs in paralytic diſorders, and ſeems to originate from loſs of power in the body of the bladder, while the ſphincter ſtill preſerves its uſual power of retention.

Although this ſpecies of the diſeaſe is often connected with a paralytic affection of all the under part of the body, yet it is frequently induced by the pernicious cuſtom of people remaining too long, eſpecially when drinking freely of diuretic liquors, without voiding

* It is that ſpecies of the diſeaſe we here mean to conſider in which the urine is collected in the bladder, but which by ſome impediment or other is prevented from being evacuated. When this diſcharge is ſuppreſſed by any affection of the kidneys, a variety of the diſeaſe is produced, which it is not in the power of any chirurgical operation to relieve; ſo that the conſideration of it does not belong to our department.

ing urine; by which means the bladder is ſometimes ſo over diſtended, as to loſe entirely all power of contraction. In this variety of the diſeaſe the catheter is commonly found to be a very certain remedy; and as in caſes of this kind it is generally eaſily introduced, it ought always to be employed as ſoon as the ſuppreſſion is evidently formed; and as a complete cure of the diſorder will be more readily obtained by avoiding the cauſe which produced it, namely, an over diſtention of the bladder, than by any other means, this circumſtance ought to be very particularly attended to. When, therefore, the leaſt inclination to void urine is felt while the inability to diſcharge it continues, the catheter ſhould be immediately employed. For although the introduction of the catheter is always diſagreeable, and ſhould never be attempted but when neceſſity points it out, yet in ſuch circumſtances as we are now conſidering, much delay or caution on this point might frequently prove very detrimental. The method of introducing the catheter, both in male and female ſubjects, is the ſame with the operation of ſounding for the ſtone, which we have already deſcribed.

2. A ſuppreſſion of urine frequently occurs in the laſt months of pregnancy, from the uterus, during that period, preſſing much upon the neck of the bladder. So effectually indeed does this preſſure of the womb obſtruct the paſſage of the urine, as on many occaſions to prevent the evacuation of a ſingle drop, unleſs the catheter is uſed: And as the inſtrument is in females commonly introduced with much eaſe, it ought always to be employed when any difficulty in voiding urine is perceived. By delaying the uſe of the catheter too long, much diſtreſs is frequently incurred. In different inſtances, the bladder has from this cauſe been diſtended to ſuch a degree as to loſe entirely its power of contraction; and in a few

few caſes, even a complete rupture of its coats has been produced.

As ſoon, therefore, as any neceſſity occurs for the uſe of the catheter, by the bladder being much diſtended, it ought to be regularly employed.

Tumors in the vagina and neighbouring parts, when they happen to arrive at any conſiderable magnitude, have frequently the effect of compreſſing the urethra ſo much as to induce a total ſuppreſſion of urine; and it is not an unfrequent conſequence of a prolapſus uteri.

The method of treatment beſt calculated for a complete removal of a prolapſus uteri, as likewiſe the means of cure commonly employed in caſes of tumors in the vagina, will be the ſubjects of different chapters; only it muſt be remembered, that till theſe views are accompliſhed, the urine ſhould in the mean time be regularly drawn off by means of the catheter, whenever it is found to be collected in any conſiderable quantity.

The very irritable ſtate of the parts about the neck of the bladder, which often prevails in caſes of ſuppreſſion of urine, renders it neceſſary in ſome inſtances to employ the catheter often. Inſtead of this, ſome practitioners have adviſed the common catheter to be allowed to remain in the bladder a conſiderable time at once, ſo as to admit of the urine being evacuated as quickly as it is ſecreted: But this is a practice which ought by no means to be admitted; for the irritation produced from a long continuance of this inſtrument in the bladder, commonly does more harm than is ever experienced from a frequent introduction of it. When it is wiſhed, however, to allow a catheter to remain in the bladder, either for this purpoſe, or in caſes of wounds in the urethra, the hard ſilver tubes in common uſe ought not to be employed; a flexible inſtrument of this kind, prepared with the Reſina Elaſtica,

Elaſtica, is found to anſwer this intention better than any other.

3. A ſtoppage to the flow of urine is not an unfrequent conſequence of ſcirrhoſities of the proſtate gland, and of obſtructions formed in the urethra in caſes of virulent gonorrhœa. The treatment beſt ſuited to theſe affections will alſo be the ſubject of a different chapter.

That ſpecies of ſuppreſſion of urine induced by ſtones impacted in the urethra, has been already treated of, and the remedy pointed out.

4. But the moſt alarming variety of the diſeaſe is that which proceeds from inflammation about the neck of the bladder, inducing pain and ſuch a degree of ſwelling in the parts as renders the introduction of the catheter inadmiſſible.

Suppreſſion of urine from an inflammatory affection of the neck of the bladder, is not unfrequently found to originate from inflammation in caſes of gonorrhœa proceeding backwards along the courſe of the urethra: An improper uſe, too, of aſtringent injections has frequently induced this ſpecies of the diſeaſe; and as the bladder is equally liable with other parts of the body to the influence of thoſe cauſes which induce inflammation, whatever has any effect of this kind in other parts will be productive of the ſame conſequences here.

The method of treatment is nearly the ſame, by whatever cauſe the inflammation may have originally been induced. Blood ſhould be diſcharged in a conſiderable quantity from ſome of the larger veſſels, and leeches ought to be applied upon the perinæum as near as poſſible to the ſeat of the diſeaſe. Opiates ſhould be preſcribed in large doſes; injections of warm water or milk ſhould be repeatedly thrown up by the rectum; and the whole body ſhould be immerſed in the warm bath. By theſe means, when the cauſe inducing the diſorder is not of an obſtinate nature, the

inflammation producing the ſuppreſſion of urine will ſometimes be removed before any troubleſome ſymptoms ſupervene. But when they do not prove effectual; when the bladder becomes painfully diſtended; and when every attempt to introduce the catheter has failed, ſome other means ought to be immediately employed for relief. With this view, nothing in ſuch circumſtances is to be depended on, but puncturing the bladder in order to diſcharge the urine collected in it.

Various methods have been propoſed for effecting this operation.—By ſome it has been adviſed to puncture the bladder a little above the pubes; others have propoſed to cut the membranous part of the urethra, proſtate gland, and neck of the bladder: And an opening from the perinæum directly into the body of the bladder, has been likewiſe recommended*. It is not neceſſary, however, in order to reach the body of the bladder, to lay the urethra open, and to divide the proſtate gland: This method, therefore, of removing a ſuppreſſion of urine, is now very deſervedly laid aſide.

Puncturing the bladder above the pubes, has been recommended by many reſpectable authors, particularly by the late Mr. Samuel Sharp; and as it is ſtill practiſed by many in preference to every other method, we ſhall here deſcribe the method of doing it.

There is no difficulty in perforating the bladder in this place; for if an opening be made any where within two or three inches of the upper part of the pubes, if it be carried deep enough, it muſt of neceſſity, in this diſtended ſtate of the bladder, be ſure to reach it: But the beſt ſituation for entering the perforating inſtrument, is about an inch or an inch and a half above the ſymphiſes of the pubes.

We are directed by writers upon this ſubject, firſt to make an inciſion of about two inches in length through the common teguments and muſcles, and then

* Vid. the works of Saviard, Tolet, and Colet.

then to perforate the bladder with a trocar. But there is no neceſſity whatever for this extenſive diviſion of the teguments and muſcles; for the operation may be done with equal ſafety, and with much leſs pain to the patient, by merely puſhing a trocar at once through the ſkin, muſcles, and bladder. As ſoon as the trocar has fairly entered the bladder, the ſtilette ſhould be withdrawn, and the canula ſecured in its ſituation by pieces of ribbon or tape connected with it and made faſt round the body of the patient; and a piece of cork ought to be fitted to the canula, that the urine may paſs off at proper intervals only, by which means alone the patient can be kept dry and comfortable.

In corpulent people, a trocar with a canula two inches long, is found to be neceſſary; but in others the inſtrument need not be longer than an inch and a half. This circumſtance, it may be remarked, is of ſome importance, and ought to be attended to; for when a long canula is uſed, and more eſpecially when the puncture is made very contiguous to the pubes, there is always ſome riſk, upon the evacuation of the urine, of pain and diſtreſs being produced by the preſſure of the canula upon the back part of the bladder. Of this we have an inſtance on record, in which the extremity of the inſtrument was found, after death, to have penetrated not only the back part of the bladder, but even the rectum*.

The canula, it muſt be remembered, is to be retained in its ſituation till the cauſe which produced the obſtruction is ſo far removed that the patient can void his urine in the uſual manner; but it has been very properly remarked†, that a canula cannot be kept above ten or fourteen days in the bladder, without contracting ſuch a calculous cruſt, as renders its extraction exceedingly difficult, and, in ſome inſtances, even impracticable. The canula, therefore, ſhould be taken out

* Vid. Sharpe's Operations of Surgery, chap. xv.
† Vid. Critical Inquiry, &c. by Mr. Sharpe, ch. iv.

out and cleaned every two or three days; but, previous to withdrawing it, a firm probe of a ſufficient length ought to be paſſed through it into the bladder, upon which it may be again returned with eaſe and ſafety as ſoon as it is properly cleared of the incruſtation.

To this mode of operating, however, ſome objections occur. From the ſituation of the canula above the pubes, the bladder is ſuſpended by it for a conſiderable length of time, and is thereby liable to ſuffer. Beſides, if the bladder ſlips off from the extremity of the canula, the operation muſt either be repeated, as we are told by Daran, was once done, or the patient muſt be left in nearly the ſame ſtate in which he was previous to the puncture being made.

If, on the other hand, we conſider the advantages attending the mode of puncturing the bladder from the perinæum, namely, that it is done with great eaſe; that the urine contained in the bladder is more readily evacuated than by puncturing above the pubes; and that it is likewiſe leſs liable to eſcape into the neighbouring parts; we will have no heſitation in giving it the preference, in perhaps every inſtance of ſuppreſſion of urine.

With a view to puncture the bladder from the perinæum, the patient ought to be laid upon his back; and his thighs being properly ſeparated and ſecured by aſſiſtants, an inciſion ſhould be made of about an inch and a half in length, beginning at the commencement of the membranous part of the urethra, and continuing it towards the anus, in a line parallel to, but at leaſt half an inch diſtant from, the rapha perinæi. In this manner the ſkin and cellular ſubſtance ought to be freely divided; which puts it in the power of the operator not only to introduce the trocar with more eaſe, but to avoid the urethra with much more certainty than he otherwiſe could do.

This being done, as the bladder is always much diſtended when this operation is neceſſary, it will be

very

Plate XXI.

Fig. 2.

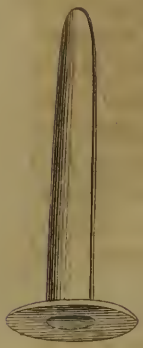

Fig. 1.

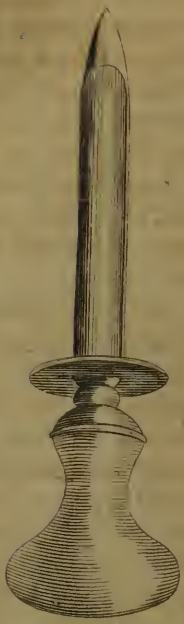

Fig. 4.

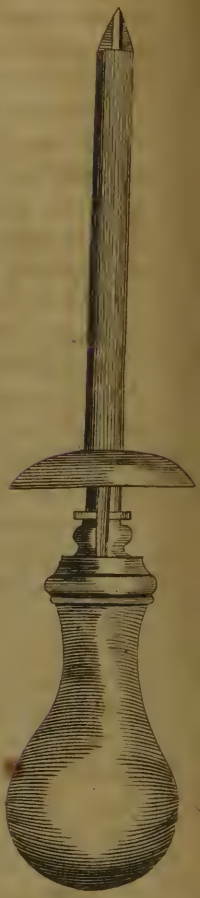

Fig. 3.

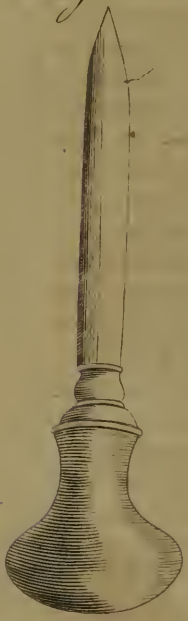

Fig. 5.

very eaſily diſtinguiſhed by preſſure at the bottom of the wound: But, whether it ſhould be felt by the finger or not, there need be no heſitation in puſhing in the trocar a little above and to the left of the proſtate gland, which, if the parts have been freely divided, may be always diſcovered; and if the point of the inſtrument be directed a very little upwards, there can be no danger of wounding either the ureters or vaſa deferentia, which ſome have been afraid of in this operation; and at the ſame time there muſt be an abſolute certainty, if the trocar is carried deep enough, of its reaching the bladder.

It has been alleged, and with ſome reaſon, that in this part of the operation the ſurgeon muſt be at ſome loſs to know when the inſtrument has reached the bladder; and ſeveral inventions have been propoſed to obviate this inconvenience. In Plate XXI, fig. 4. is repreſented a very ſimple contrivance for this purpoſe: It conſiſts of a trocar, with a canula of the uſual form, and a deep groove in the ſtilette, ſo that urine begins to flow along the groove, immediately on the inſtrument having entered the bladder. As ſoon, therefore, as by this circumſtance it is known that the trocar is properly introduced, the ſtilette ſhould be withdrawn; and the canula ſhould be ſecured in its ſituation by two pieces of tape, connected with two rings upon its brim, being firmly tied to a circular bandage round the patient's body: And if one of theſe tapes be tied behind immediately above the ſacrum, and the other directly above the pubes, the canula will not be eaſily diſplaced.

It is equally neceſſary here as when the operation is done above the pubes, to change the canula, or at leaſt to clean it every now and then; and in this ſituation too, ſo long as the canula is found to be neceſſary, the urine may be retained and drawn off at pleaſure, by a plug of cork properly adapted to the canula.

In

In treating of this operation we have not mentioned a method that has been propoſed of perforating the bladder by means of a curved trocar entered from the rectum. Indeed it ſcarcely deſerves to be noticed, as no advantages can probably occur from it that may not with more certainty be obtained from perforating in the perinæum; and it is attended with this very material inconvenience, that by paſſing the inſtrument in at the back part of the bladder, much riſk muſt be incurred of wounding either the ureters, vaſa deferentia, or veſiculæ ſeminales; while at the ſame time a paſſage will be formed by which the fæces may find acceſs to the cavity of the bladder, and by which much miſery may be induced: Without further conſideration, therefore, we can with freedom venture to ſay, that this method of operating ought never to be employed.

In the operation of lithotomy in females, we aſſigned reaſons, which appear to be ſufficiently concluſive againſt the method of cutting into the bladder from the vagina; but theſe reaſons do not apply with equal force againſt the propriety of puncturing in this part. On the contrary, whenever there is any neceſſity for performing this operation in women, it cannot poſſibly be done in any other way either with ſo much eaſe or certainty, as from the vagina. When the bladder is much diſtended with urine, it is readily diſcovered by the finger from the vagina; and from this circumſtance it may with great ſafety be perforated with a trocar. The fore finger of the left hand being introduced into the vagina, the point of the inſtrument ought to be conducted upon it, and ſhould at once be puſhed through the vagina into that part of the bladder which is firſt diſcovered by the finger; for here the ureters run no riſk of being wounded, which farther back they certainly would do. After the trocar is fairly introduced into the bladder, and when the urine is all evacuated, the canula ought to be left in its place, and

ſhould

ſhould be continued there as long as the cauſe ſubſiſts which produced the ſuppreſſion. That the canula may be firmly ſecured, it ought to be of a ſufficient length for paſſing out at the vagina, and to admit of its being tied to the T bandage by means of tapes properly connected with it.

CHAP.

CHAP. XIV.

OBSTRUCTIONS IN THE URETHRA.

IN the preceding ſection, when treating of the cauſes of ſuppreſſion of urine, obſtructions produced by claps, of which caruncles are ſuppoſed to be the moſt common, were mentioned as the moſt frequent and moſt remarkable.

But although we have particularly mentioned the term Caruncle, by which is meant, a fleſhy excreſcence ariſing from the membrane of the urethra, we are by no means convinced that it is a frequent occurrence. That ſuch excreſcences are ſometimes met with, particularly towards the extremity of the yard, there is no reaſon to doubt; but as I have had many opportunities of diſſecting theſe parts, in patients who had long laboured under ſymptoms ſuppoſed to proceed from caruncles in the back part of the urethra, and as caruncles were not in any of theſe found to be the cauſe of the diſorder, I am therefore clearly of opinion that their exiſtence in the more remote parts of the urethra is a very uncommon occurrence. I have often obſerved productions of this kind, within half or a quarter of an inch of the extremity of the urethra, eſpecially in caſes where the glans and prepuce have been covered with watery excreſcences of a ſimilar nature: But from having never, even in caſes of this kind, found them ſpread farther up the canal, although it is not a proof that they never occur in other parts of it, yet this, together with ſome obſervations of a ſimilar nature by Dionis, Saviard, Mr. Petit, and others,

others, is sufficient authority for the opinion we have advanced, that caruncles in the more remote parts of the urethra is a circumstance rarely met with. Daran indeed speaks much of this species of obstruction; and he no doubt had more practice in disorders of this nature than perhaps ever fell to the share of any other individual: But if he is properly attended to, it will be found, that his ideas on this subject are by no means accurate; for he evidently confounds other causes of obstruction, particularly callous strictures and cicatrices of old ulcers, with, and mistakes them for, caruncles.

Practitioners in former times, as well as many in more late periods, have doubted so little of the frequent occurrence of caruncles, that almost every instance of obstructed urethra succeeding to a clap has been attributed to this cause. What we have here advanced, however, will have some influence in setting this matter in a different point of view; and we shall now proceed to enumerate the different causes by which obstructions in the urethra may be produced.

1. Although we have said that caruncles are rarely if ever met with in the superiour part of the urethra, yet as they sometimes occur towards the extremity of this canal, we cannot avoid mentioning this as one cause of these obstructions. We must again observe however, that in every instance we have met with of caruncles, or carnosities as they are sometimes termed, they have always been of the same nature with those warty excrescences so frequently observed upon the prepuce and glans as a consequence of gonorrhœa: Most frequently, too, they have been connected with external affections of this kind.

2. Ulcers in different parts of the urethra have on some occasions been known to produce very complete obstructions.

On opening the bodies of patients who have at the time of death laboured under gonorrhœa, it has frequent-

ly been found that no ulceration could be diſcovered; and this gave riſe to the idea that ulcers in ſuch caſes never take place. We now know indeed that very great quantities of matter, even of a purulent kind, may be furniſhed by parts merely inflamed, and that are not in any degree ulcerated: But we alſo know, that parts remaining for any conſiderable length of time in ſuch a high degree of inflammation as to furniſh a great ſupply of pus, are very apt to become ulcerated; and if this happens in other parts of the body, we may conclude that the ſame cauſe will be productive of the ſame effects in the urethra. Accordingly, there is no reaſon to doubt of the exiſtence of ulcers merely as the conſequence of an inflamed ſtate of the urethra; but it is likewiſe certain, that ulcers are ſometimes met with in the urethra from the ſame cauſe by which ſores or chancres are produced in the glans, namely, from the mechanical effects of the venereal poiſon, independent of the intervention of any degree of inflammation.

The excretory ducts of the different glands in the urethra, particularly of the proſtate gland, as alſo the ducts of the veſiculæ ſeminales, and the other parts about the verumontanum, have commonly been conſidered as being particularly obnoxious to the effects of the venereal virus; and ulcerations are accordingly ſaid to be more frequently met with in theſe parts than in any other. Whatever may have occurred to others for the foundation of this opinion, I will not pretend to ſay; but, from all I have been able to learn of this ſubject from my own experience, I would ſay, that ulcers occur much more frequently towards the extremity of the urethra than in other parts of it, and that they are very rarely found farther back than an inch or two from the point of the yard.

3. Diſſection has ſhown that a mere contracted ſtate of the urethra is to be conſidered as a frequent

cauſe

cauſe of obſtruction. In ſome inſtances the ſtricture has been confined to one point, and in others the paſſage has been found contracted in different parts. A real contracted ſtate of the urethra is probably more frequently produced by the cicatrices of old ulcers, than by any other cauſe; but as parts which have continued long in a ſtate of inflammation, are very apt to become thickened, and even harder than they are ever found to be in a ſtate of health, a gonorrhœa, attended with much inflammation, may frequently, it is probable, be productive of this effect.

Aſtringent injections are ſuppoſed by thoſe who conſider them to be pernicious, as apt to produce a contracted ſtate of the urethra more frequently than any other cauſe. Injections of this kind, when improperly applied to parts already in a ſtate of high inflammation, will no doubt often do much miſchief; and, by increaſing the inflammatory ſtate of the urethra, may in this manner tend to produce ſtrictures: But this is evidently not the fault of the remedy, but of the improper uſe of it. Similar objections might with equal reaſon be adduced againſt the uſe of every medicine with which we are acquainted; for no remedy ever proves more effectual, or more ſafe in its operation, than aſtringent injections in caſes of gonorrhœa. When properly applied, indeed, many caſes occur of obſtinate claps being ſafely cured by injections which cannot be removed by any other means.

4. Tumors in the cellular ſubſtance ſurrounding the urethra, or in any of the glands connected with it, very frequently produce moſt complete obſtructions in the courſe of this canal. And inflammation, whether originally induced by a gonorrhœa or by any other cauſe, if it terminates in ſuppuration, is often attended with this effect. In ſuch caſes, indeed, as ſoon as the matter collected in the abſceſs is diſcharged, the obſtruction produced by it is in general removed: In ſome inſtances, however, it happens otherwiſe; for, in

different

different caſes of this nature, I have found, that the compreſſion produced by the tumor has induced ſuch a firm adheſion between the ſides of the urethra as to obliterate the canal entirely. This, however, can only occur from a long continuance of the preſſure produced by the tumor; and which, again, can never be continued for any conſiderable length of time in ſuch a degree as completely to obſtruct the paſſage, unleſs the urine has forced ſome other opening for itſelf: And accordingly, in all ſuch caſes, one or more openings, communicating with the urethra, are found between the ſeat of the diſeaſe and the proſtate gland.

5. Of all the cauſes productive of obſtruction to the paſſage of the urine, which I have ever been able to diſcover, none are ſo frequent as a particular kind of fulneſs or enlargement of the corpus ſpongioſum urethræ. On diſſecting the penis of ſuch as have labourced long under obſtructions of this kind, an enlargement or thickening of the ſubſtance of the urethra as now deſcribed, has been very often met with; and this enlargement has, in many inſtances, proceeded ſo far as totally to obſtruct the paſſage of the urine.

In ſome of theſe this affection of the urethra was confined to a particular ſpot. In others it extended a conſiderable length; while in ſome it was found to have attacked different parts of the canal, leaving intermediate ſpaces of it perfectly ſound.

We have thus enumerated the cauſes which appear moſt frequently to be productive of obſtructions in the urethra. We ſhall now proceed to the method of treatment beſt calculated for their removal.

When obſtruction of the urethra ariſes from cauſes enumerated under the fourth head, our practice muſt be directed by the nature of the tumor by which the diſorder is produced. Accordingly, when tumors of an indolent or ſcirrhous nature are found to induce ſuch obſtructions, extirpation of the diſeaſed parts, when this is found to be practicable, is the only means

means of relief which will probably prove uſeful: But although tumors of this kind which appear externally, and which do not penetrate deep, may be extirpated with ſafety; yet when the proſtate gland, or any of the parts about the neck of the bladder, are found to be the ſeat of the diſeaſe, the removal of them cannot poſſibly be attempted. In ſuch deſperate caſes, cicuta has been often uſed; but ſeldom, I believe, with much advantage. In an ulcerated ſtate of the parts, a plentiful uſe of uva urſi has been known to give relief; but nothing with which we are acquainted, affords ſuch a probable chance of relief, as long continued, though very gentle, courſes of mercury. In the mean time, a plentiful uſe of mucilaginous drinks is found to prove ſerviceable, and the violence of the pain muſt be obviated by adequate doſes of opiates.

When, again, ſuch tumors are evidently of an inflammatory nature, if they are not ſoon removed by diſcuſſion, the moſt effectual means ſhould be employed for promoting their ſuppuration.

Theſe we have already in a former publication pointed out*. As ſoon as by theſe, or ſimilar means, the formation of matter is accompliſhed, the abſceſs in which it is collected ſhould be immediately opened. In ſome other parts of the body, whenever an inflammatory tumor is probably to terminate in ſuppuration, it is conſidered as good practice to delay giving vent to the matter till pus is thoroughly formed; but in this ſituation, as much diſtreſs would for certain be produced by any conſiderable delay, the abſceſs ought undoubtedly to be opened as ſoon as there is the leaſt reaſon to ſuppoſe that the preſſure upon the urethra would be diminiſhed by doing ſo; and this muſt always be the caſe whenever any collection of matter is evidently diſcovered. In every abſceſs, therefore, of this kind, the cure of the ſuppreſſion of urine

* Vid. Treatiſe on Inflammation and its conſequences.

urine produced by it will be accompliſhed with more certainty by diſcharging the matter contained in it than by any other means. If, on laying the collection open, however, it ſhall be found that the ſtoppage in the urethra is not removed, recourſe muſt be had immediately either to a bougie or a catheter: By introducing a bougie of a proper ſize and conſiſtence, and paſſing it eaſily along the urethra, any obſtruction produced by the preſſure of the abſceſs may in general be effectually removed; and by continuing to inſert either a bougie or a flexible catheter, and allowing it to remain for ſeveral hours daily, every effect which ſuch obſtructions might otherwiſe produce, will be very certainly obviated.

In ſome inſtances, again, when abſceſſes of this kind are allowed to preſs too long upon the urethra before they are opened, the urine burſts into the cellular membrane of the perinæum and other contiguous parts, and from thence forms one or more external openings; and in this manner induces a diſorder which always proves very diſtreſſing to the patient, and extremely perplexing to practitioners. This, however, will be afterwards more particularly conſidered, when we come to ſpeak of the fiſtula in perinæo. In the other caſes of obſtructions in the urethra, proceeding from caruncles when they happen to occur; from ulcers, and the cicatrices produced by them; from ſtricture and contraction of the urethra; and from an enlarged and thickened ſtate of the corpus ſpongioſum urethræ; when theſe ariſe from a venereal cauſe, the diſorder of the general conſtitution muſt be particularly attended to; and we know that it can be effectually removed by a proper uſe of mercury only. At the ſame time, we muſt attend to the local affection of the urethra; and here a little conſideration will render it evident, that the ſeveral cauſes of the diſorder muſt operate in the ſame manner with tumors mentioned above, namely, by inducing a diminiſhed

or

or contracted ſtate of the urethra: And this accordingly accounts for the univerſal utility of the bougie in obſtructions of this paſſage; a remedy which, in every affection of this nature, proves chiefly ſerviceable by its mechanical action on the obſtructed part. It has been alleged indeed by many, particularly by Mr. Daran and Mr. Sharpe, that, in removing caruncles and other cauſes of obſtruction, bougies prove more uſeful by what they term their Suppurative quality, than by any other property: By which they mean to ſay, that bougies may be compoſed of ſuch materials as will induce a ſuppuration upon the caruncles to which they are applied; and that this ſuppuration, if continued for a ſufficient length of time, will ultimately deſtroy all ſuch diſeaſed parts*.

This idea, although founded on inaccuracy, continues ſtill to prevail: But a very little attention muſt ſet the matter in a more diſtinct point of view; and will make it appear, that the effect in general experienced from bougies, is obtained more from the mechanical preſſure produced by them, than from any other property. Among other reaſons which might be mentioned as a refutation of the opinion reſpecting the advantages to be obtained from the ſuppurative effects of bougies, the following ſeem to be ſufficient for our purpoſe.

1. Thoſe who allege that bougies prove commonly uſeful by inducing ſuppuration, have always affirmed

* For Mr. Daran's account of this matter, ſee his Treatiſe on Diſeaſes of the Urethra: And Mr. Sharpe's account of it may be ſeen in his Critical Inquiry, chap. vi. Although Mr. Sharpe is clearly of opinion, that the principal advantage derived from bougies proceeds from their influence in inducing ſuppuration; yet, whenever he attempts to inveſtigate the matter with accuracy, he is obliged to acknowledge, that the preſſure produced by them has no inconſiderable effect: For he ſays, "That though I have a great opinion of the good effects produced by the ſuppuration, yet I believe alſo, that bougies operate by diſtending the urethra; and I will go ſo far as to give it as my judgment, that even the cures done by Mr. Daran are wrought partly by diſtention, and partly by ſuppuration; though he himſelf aſcribes them to ſuppuration only." Vide p. 171, fourth edition, loc. cit.

ed that ſuch caſes of ſuppreſſion of urine as are relieved by this remedy, originate moſt frequently from caruncles in the urethra; and that the ſuppuration produced by the bougies, tends to deſtroy, or as it were to diſſolve, them. Although excreſcences of this nature may ſometimes prove the cauſe of obſtructions in the urethra; yet, as we have already endeavoured to ſhow, they are by no means a frequent one.

From all the experience, indeed, which I have had in affections of this kind, I would ſay, that there does not one tenth of the whole depend upon the exiſtence of this cauſe. It muſt therefore follow, if this idea reſpecting the cauſe of the diſorder be ill founded, that the ſuppoſed modus operandi of the remedies employed in it muſt likewiſe be erroneous; for every practitioner who has attended much to this branch of buſineſs, muſt acknowledge, that bougies in every complaint of this nature, prove much more frequently uſeful than the cauſe upon which they have been ſuppoſed chiefly to operate is found to exiſt. Indeed the general utility of bougies in caſes of obſtructed urethra, muſt be acknowledged by all who have uſed them, while ſcarcely any advantage is derived from the uſe of any other remedy.

2. But although we ſhould allow that caruncles are frequently formed in the urethra, we cannot admit that a ſuppuration induced upon them would have much influence in removing them.

We know, that, in other parts of the body, warts or other hard excreſcences cannot be carried off merely by a ſuppuration being formed upon them; and we cannot ſuppoſe that there is much difference in this reſpect between the ſame diſorder in the urethra, and in other parts of the body.

3. It has been ſaid, that theſe bougies, at the ſame time that they act by inducing ſuppuration, have likewiſe ſome influence as an application of a cauſtic nature; and that many of Mr. Daran's bougies, the compoſition

compoſition of which was kept ſecret, were evidently poſſeſſed of this property.—Mr. Daran, in order to render the operation of his remedy as myſterious as poſſible, did indeed allege, that his bougies were endowed with many virtues: But no candid practitioner will ſay, that any application of this kind, poſſeſſed of a degree of cauſticity ſufficient to deſtroy warts, can with propriety be introduced into the urethra; for, if made of ſuch a ſtrength as to corrode theſe excreſcences, they would ſurely be in great danger of injuring the whole courſe of the urethra to which they are applied.—Indeed, the mildeſt materials we can employ, frequently produce inconveniences by their ſtimulating power. For upon withdrawing any bougie that has remained long in the urethra, it is almoſt always found covered with matter or pus. It is this circumſtance, we imagine, that firſt ſuggeſted the idea of bougies acting by inducing ſuppuration; which, however, is to be conſidered only as a neceſſary effect of a ſtimulus applied to a delicate ſenſible membrane, and in no reſpect eſſential to the cure of the diſorder for which the bougie was uſed.

4. But without having recourſe to the ſuppurative or eſcharotic effects of bougies, the advantages frequently derived from them, in obſtructions of the urethra, may, as we have already endeavoured to ſhow, be eaſily and ſimply accounted for upon the principle of mechanical preſſure alone.

We have thus thought it proper to conſider the action of bougies with minuteneſs; for till once the idea is thoroughly exploded of medicated bougies, as they are termed, being neceſſary, much miſchief may be done, by forming them of irritating or even of eſcharotic materials, as is ſometimes the caſe, inſtead of rendering their compoſition perfectly mild and inoffenſive, as in every inſtance it ought to be.

The opinion we have endeavoured to eſtabliſh being admitted, namely, that bougies ought to operate

ſolely by mechanical preſſure, it muſt neceſſarily follow, that, in the formation of bougies, much will depend on their being made of a proper conſiſtence, neither too hard nor too ſoft. When too ſoft and compreſſible, they cannot act with advantage againſt the obſtructing cauſe, and againſt which preſſure is intended to be applied; and when too hard, they are apt to crack, and are neither introduced into nor retained in the urethra with ſo much eaſe as when made of a proper conſiſtence: Bougies ought likewiſe to have a ſmooth poliſhed ſurface, to facilitate their introduction; and laſtly, they ought, as we have already remarked, to be compoſed of very mild materials, ſo that when introduced they may give as little irritation as poſſible.

Bougies may be made of a great variety of materials; but, ſo far as my experience enables me to judge, no compoſition anſwers the ſeveral purpoſes we have mentioned ſo well as a plaſter of which ſimple diachylon forms the baſis.—The following form I have had much experience of.

℞. Emplaſt. Diachyl. ſimpl.				℥iv.
Ceræ puriſſ.	-	-	-	℥iß.
Ol. Oliv. opt.	-	-	-	℥iij.

The bees wax and oil give a degree of ſoftneſs to the diachylon which prevents it from cracking, which it is otherwiſe apt to do upon being long kept; beſides, a better poliſh can be given to bougies prepared from a plaſter compoſed partly of wax, than can be given to thoſe made of any other materials. Burgundy pitch, roſin, and even ſome of the turpentines, have been adviſed as proper additions to theſe materials: But all of them tend to render the compoſition too irritating; and as wax communicates a ſufficient degree of tenacity to it, theſe ought never to be employed.

The diachylon ſhould be ſlowly melted, and the wax being alſo melted in the oil in a different veſſel,

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let the two be mixed properly together; and while the liquid continues ſtill tolerably warm, let pieces of fine firm old linen be dipt in it, care being taken, by means of a ſpatula, to cover the whole linen as equally as poſſible.—If the liquid is of a proper heat, no more of the plaſter will adhere to the linen than is juſt neceſſary; but as air bubbles are apt to occaſion inequalities on the ſurface of the cloth, the ſpatula made uſe of ought to be ſomewhat warmer than the plaſter, and by means of it the whole ſhould be rendered perfectly ſmooth. Some indeed have deſired the plaſter to be ſpread entirely by the ſpatula, rather than to dip it: This, however, is attended with much more trouble, and does not cover the cloth with that equality which the formation of bougies requires.

As ſoon as the dipt cloth is ſufficiently cold, it may be formed into bougies; and the manner of doing it is this: The number intended to be formed ought all to be cut; and the eaſieſt and moſt exact method of doing this is by means of a ſharp pointed knife directed by a ruler. The pieces ought to be from nine to ten and eleven inches in length; and as they ſhould always be ſmaller at the point which enters the urethra than at the other, this circumſtance ſhould be attended to in the cutting of it into ſlips. The thickneſs of the linen, and of the plaſter with which it is ſpread, muſt in ſome meaſure determine the breadth of theſe ſlips for the different bougies: But when the linen is of a proper degree of fineneſs, and is rightly ſpread, a bougie of a middle ſize, may be formed of a ſlip of about five eighths of an inch broad at its largeſt end; and the point of it may be made of a proper ſize, and may be thus adapted to any particular caſe, by making the piece of linen taper more or leſs from about two or three inches from its ſmaller extremity. Theſe ſlips of ſpread linen are now to be rolled up as neatly as poſſible by the fingers;

gers; and in order to give them a ſmooth poliſhed ſurface, they ſhould be ſmartly rolled between a piece of ſmooth hard timber and a plate of fine poliſhed marble. This being continued till the whole are rendered perfectly ſmooth and firm, and their points being rounded properly in order to facilitate their introduction, they are in this ſtate to be preſerved for uſe.

The directions we have now given will convey an idea of the method of preparing bougies; but no ſurgeon can ever become ſo expert in forming them, as thoſe artiſts who are daily accuſtomed to prepare them in very conſiderable quantities.

We come now to the application of the bougie.—When that kind of obſtruction occurs which points out the bougie as the moſt proper remedy, the following is the method of uſing it: A bougie, adapted to the ſize of the paſſage through which it is to go, is to be well covered with fine oil, in order to facilitate its introduction; and the penis being firmly graſped and extended with one hand, the point of the inſtrument is to be inſerted into the urethra with the other; and being puſhed forward with caution, it is in this manner to be carried on till it meets with the cauſe of obſtruction; when, if a moderate force makes it paſs, our object is ſo far accompliſhed; but if, after different attempts, it cannot be eaſily carried through, it ſhould be immediately withdrawn; and at next trial, which in order to avoid any riſk of inflammation, ſhould not be made till the following day at ſooneſt, a bougie with a ſmaller point ſhould be employed.

A great deal of nicety is requiſite in this part of the operation; for, by proceeding gradually and with due caution, every riſk may be avoided of injuring the urethra, at the ſame time that the object in view may be often accompliſhed with more certainty than if much force was made uſe of. As ſoon as we reach the cauſe of obſtruction, if a bougie of the

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ſmalleſt ſize is employed, inſtead of puſhing it on with force, as to a certain degree may be done with a catheter, it anſwers the purpoſe much more certainly to twirl it between the finger and thumb, ſo as to make it preſs very moderately upon the part which it ought to paſs. But, on the other hand, although miſchief has often accrued from too much violence being uſed in inſerting bougies, and although every practitioner ought therefore to be warned of the danger occurring from it; yet, when much reſiſtance is met with, there is a neceſſity for puſhing them on with ſome degree of firmneſs. If this, however, is done with due caution and in a proper direction, which experience alone can teach, it may frequently be accompliſhed without any riſk, and with much advantage to the patient. In many caſes, indeed, unleſs a tolerable degree of force be uſed, the bougies will not paſs through the obſtruction, and no benefit will therefore be derived from them; for unleſs a bougie be made to paſs the point of obſtruction, it cannot operate to any advantage.

This, I muſt obſerve, is a point of much importance, and ought to be kept in view. For although no unneceſſary force ſhould be ever employed, yet in caſes of this kind we commonly meet with too much timidity: For, in ordinary practice, if the bougie meets with any unuſual reſiſtance, and if it cannot, on the firſt or ſecond attempt, be introduced, the caſe is commonly conſidered as deſperate, and no further trials are made. I can from much experience, however, ſay, that ſcarcely any caſe ever occurs in which the bougie, by a frequent repetition of cautious trials, may not be introduced. Even where I have been convinced that the paſſage of the urethra has at a particular point been entirely obliterated by the ſides of it adhering to one another, and where the urine has been voided by openings in the perinæum,

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the bougie, with a due degree of force properly applied, has at laſt effected a cure.

In ſome inſtances, bougies with very ſmall points will enter, when others of a larger ſize will not penetrate; but, in general, when the obſtruction is found to be unuſually firm, thoſe of a middling ſize are preferable to ſuch as have very ſmall points: For bougies of this form are very apt to bend if they do not paſs forward at once; and as ſoon as the point yields in any degree, the bougie ſhould be withdrawn, as it cannot afterwards be puſhed forward; for if more force is now employed, inſtead of being carried farther into the urethra, it becomes twiſted, and is ſure to produce a good deal of pain in the extraction.*

By different cautious trials, the bougie will at laſt be made to paſs the different points of obſtruction, for in ſome inſtances they are met with in more points than one; and as inſtances have occurred of bougies ſlipping into the urethra altogether, and even into the bladder itſelf, this accident ought to be carefully guarded againſt by a piece of narrow tape or ſoft thread, connected with the extremity of the bougie, and either tied round the penis behind the glans, or to a circular belt paſſed round the body.

Certain regulations have been mentioned by authors for the length of time a bougie ought to be kept in the urethra: But with ſome patients they occaſion a good deal of pain, while with others they produce little or no uneaſineſs; and as it is the degree of pain induced by them which ought to regulate the time they remain in the urethra, nothing deciſive,

* With a view to give more firmneſs to bougies, Mr. Deaſe, an ingenious ſurgeon of Dublin, recommends their being formed upon catgut.—Vid. Obſervations on the different Methods of treating the Venereal Diſeaſe, by William Deaſe, Dublin.

We may likewiſe mention, that, for purpoſes of this kind, catgut alone anſwers exceedingly well.—When cut into the length of bougies, and on being properly poliſhed by rubbing on a plate of marble, they become ſufficiently firm for forcing almoſt any obſtruction that can occur.

ciſive, it is evident, can be ſaid upon this ſubject. When their introduction is attended with much pain, they ought neither to be allowed to remain long at once, nor ſhould they be uſed above once in the two or three days: But when they can not only be introduced but be retained in the urethra without producing much uneaſineſs, they ought to be kept almoſt conſtantly employed; for as it is by preſſure almoſt ſolely that they produce any advantage, and as this preſſure muſt be continued for a certain length of time according to the nature of the obſtruction, the more conſtantly the bougie can be uſed, the more quickly a cure will probably be accompliſhed. And with the ſame view the ſize of the bougie ſhould be gradually increaſed, till one of ſuch a thickneſs can be eaſily introduced as the urethra could probably receive, were we certain that no obſtruction exiſted.

When much uneaſineſs is incurred by the uſe of bougies, the patient ſhould never employ them but when he can confine himſelf either to bed, or at leaſt to his apartment; but with many the diſtreſs produced by them is ſo trifling, that they can walk eaſily with bougies of the largeſt ſize inſerted along the whole courſe of the urethra.

Nothing certain can be ſaid with reſpect to the length of time that bougies ſhould be uſed, as this muſt be always regulated by their effects; which, again, will in a great meaſure depend on the nature of the obſtruction. This, however, we can with freedom propoſe, that the bougies ought to be continued, not only while any difficulty in paſſing water remains, but for a conſiderable time thereafter.

In the uſe of bougies, care ſhould be taken never to puſh them altogether into the bladder: For, even when prepared of the very beſt materials, a portion of the compoſition may crack and fall off; and if this ſhould happen to be too large to paſs off with the urine, it may be a means of creating much diſ-

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treſs, by ſerving as a nucleus for a ſtone. When it is neceſſary to paſs any inſtrument of this kind ſo far as the bladder, a catheter ought undoubtedly to be employed; for the riſk attending the introduction of a bougie to ſuch a length muſt be always conſiderable.

Several kinds of flexible catheters have been invented for the purpoſe of remaining in the urethra with eaſe, and for anſwering both the intention of a catheter and of a bougie. Various methods have been propoſed for preparing theſe inſtruments; but the moſt convenient form of any I have met with conſiſts in a tube formed of flexible ſilver wire, wrapped ſpirally round a ſteel probe of a proper length and thickneſs; and this being neatly covered with a piece of fine linen ſpread with a bougie plaſter, and the probe upon which it was formed being withdrawn, the inſtrument is thus completed; only it muſt be afterwards furniſhed with a ſilver wire or cleanſer, in a ſimilar manner with other catheters.—Theſe inſtruments, however, do not prove ſo ſerviceable as was once expected; but when it is ever neceſſary to allow a catheter to remain long in the urethra, one of this flexible form anſwers the purpoſe exceedingly well. It muſt be remembered, however, that as theſe catheters are covered with plaſter, they ought not to be allowed to remain long in the bladder, for the ſame reaſon that we have deſired bougies not to be inſerted into it. When it is neceſſary to leave a flexible catheter in the bladder, thoſe compoſed of the reſina elaſtica ſhould be employed, as the adheſive property of this ſubſtance prevents it from cracking and falling off, as every kind of plaſter is apt to do.

When ſpeaking of the formation of bougies, we have ſaid, that as it is chiefly by mechanical preſſure they prove uſeful; ſo a proper conſiſtence is the principal circumſtance to be kept in view in their compoſition.

compoſition. This, we muſt ſtill ſay, ought to be the leading object in the employment of bougies: But when any tolerable certainty occurs of a chancre or internal ulceration exiſting in the urethra, as nothing would probably prove ſo uſeful in cicatriſing the ulcer as a local application of mercury, a conſiderable quantity of quickſilver extinguiſhed in honey may with advantage be added to the compoſition we formerly mentioned.—If two ounces of mercury, properly extinguiſhed in this manner, be added to every ſix ounces of plaſter in a melted ſtate, a pretty ſtrong mercurial preparation will thus be obtained; and as mercury in this ſtate produces little or no irritation, it may be employed with perfect ſafety.—Red precipitate in fine powder has been ſometimes adviſed to be ſprinkled upon bougies, not only to be applied in this manner to ulcers in the urethra, but with a view to corrode other cauſes of obſtruction: This, however, is a practice which we hope is now generally laid aſide, as in many inſtances the precipitate would ſurely prove too violent a ſtimulus for the internal ſurface of the urethra.

Whatever may, in diſorders of this kind, be the immediate cauſe of obſtruction to the free paſſage of the urine, a venereal taint will for the moſt part be found to be the original cauſe of the whole: We have therefore deſired, that at the ſame time the uſe of bougies is perſiſted in, the patient ought to be put upon a very complete courſe of mercury, in order to deſtroy every poſſibility of his ſuffering again from the ſame cauſe; for we need ſcarcely obſerve, that as long as any venereal infection continues to prevail, little or no permanent advantage can be expected, either from the uſe of bougies or any other remedy.

We have thus entered fully into the conſideration of the uſe of bougies. Indeed, too much attention cannot be given to a practice from which ſuch material advantages may be derived: For by a proper

uſe of this remedy, almoſt every caſe of obſtructed urethra proceeding from any of the cauſes we have enumerated, may be either altogether cured, or at leaſt greatly relieved; and was it not for the advantages derived from bougies, almoſt every inſtance of ſuch obſtructions would terminate in the moſt complete degree of miſery.

Before concluding the ſubject now under conſideration, we muſt not omit to mention the effects of bougies in ſome caſes of troubleſome gleets.—Whenever a diſcharge of this kind is kept up by an excoriation or ſlight ulceration of the urethra, as is ſometimes the caſe, no remedy whatever proves more effectual than bougies of the mercurial kind, ſuch as we have recommended; and even in the ordinary kind of gleet proceeding merely from a relaxed ſtate of the excretory ducts opening into the urethra, nothing will more certainly effect a cure than the compreſſion induced by the common bougies.—Whether they operate by affording a proper ſupport to the relaxed membrane of the urethra, or by inducing ſome degree of inflammation upon the affected parts, I know not; but in many inſtances of thoſe obſtinate gleets which have reſiſted the moſt powerful injections, bougies have been found to prove effectual.

We have hitherto conſidered obſtructions of the urethra in male ſubjects: But the ſame affections occur in women; and when they do ſo, they demand an equal ſhare of attention. As bougies afford the eaſieſt means of removing ſuch obſtructions, this method of cure ſhould always be firſt attempted: But in women it ſometimes happens, that tumours of ſuch a ſize form in the urethra as cannot poſſibly be cured by this remedy; and as the urethra in females is not only very ſhort, but much wider than in men, ſwellings of this kind may often be removed either by ligature or with the ſcalpel.—Nay, we know from experience, that a tumor adhering even to the bladder itſelf,

itſelf, may, in women, be taken off, not only with eaſe, but with ſafety. In ſuch caſes, there is a neceſſity for laying the urethra open; which, at either of the ſides, may be done with great ſafety, and without any riſk of wounding the vagina: And if an inciſion be made here with freedom, any tumor ſituated near to the neck of the bladder, may be ſo far pulled down as to admit of the application of a ligature; and whenever it can be laid hold of, this may be done without any danger.

A remarkable caſe is related of this kind by Mr. Warner, where a tumor of the ſize of a turkey's egg, produced from the internal membrane of the bladder, was extirpated by ligature, and with moſt complete ſucceſs*. When ſuch tumors are not ſo large as totally to obſtruct the paſſage of the urine, or to be productive of much diſtreſs, a prudent practitioner would no doubt rather wiſh to avoid touching them: But when the reverſe of this is the caſe, and when the urine is voided with much difficulty, neceſſity in ſuch circumſtances points out the propriety of the operation we have recommended; but it muſt be comfortable for a patient, in a ſituation which would otherwiſe be deſperate indeed, to know that a remedy can be employed from which a cure may be expected.

It has been adviſed even by practitioners of reputation, when obſtructions of the urethra proceed from caruncles or carnoſities, as they are termed, to deſtroy them by the uſe of lunar cauſtic; and inſtruments have been invented for applying the cauſtic with as much ſafety as poſſible to the diſeaſed parts: But the riſk of injuring the contiguous parts by applications of this nature, even when guarded in the moſt cautious manner, is evidently ſo great, as muſt forever prevent the practice from being generally received.

CHAP.

* Vid. Caſes and Remarks in Surgery, by Joſeph Warner

CHAP. XV.

OF THE FISTULA IN PERINÆO.

BY the term Fiſtula in Perinæo is meant, a ſinuous ulcer of this part, communicating moſt frequently with the urethra only, but in ſome inſtances directly with the body of the bladder. The term however, is not ſtrictly confined to ulcers of this kind in the perinæum; it is alſo applied to ſores of a ſimilar nature opening into the ſcrotum, or terminating in any part of the penis.

The word Fiſtula ought with propriety to be reſtricted to that ſpecies of ſinus in which the edges of the ſore have become hard and callous; but cuſtom now applies it indiſcriminately to every ulcer that is not ſuperficial, but which lies deep, and diſcharges its contents by one or more narrow openings in the external teguments.

In conſequence of the latitude given to the meaning of the term Fiſtula, a great variety of appearances are exhibited under this general denomination of Fiſtula in Perinæo. In ſome inſtances a ſingle opening is met with in one part or other of the perinæum or penis, diſcharging matter mixed with urine; and this without any hardneſs or inflammation of the contiguous parts. But in others, inſtead of this ſimple form of the diſeaſe, along with one or more external openings communicating with the urethra, at which all, or at leaſt the greateſt part, of the urine is paſſed, the parts contiguous to theſe openings are very much diſeaſed.

diſeaſed. In ſome inſtances they are found merely in a hard callous ſtate, without much enlargement; but in others they are not only exceedingly hard, but much ſwelled, inflamed, and very painful. In a few caſes, this hardneſs and enlargement is confined to a ſmall ſpace; but moſt frequently, when the diſorder has been of long continuance, it extends nearly from the anus to the ſcrotum, reducing the whole perinæum to a ſtate of calloſity. In many, too, the malady does not ſtop here; but the ſcrotum, and even the fore part of the penis, are liable to be affected by it; and when the urine unfortunately eſcapes into the cellular ſubſtance of theſe parts, particularly when it lodges in any part of the ſcrotum, it is apt to terminate in a great deal of miſchief.

As a conſiderable part of the urine, and ſometimes the whole of it, is evacuated by ſores of this nature, they are, on every occaſion, productive of much diſtreſs; and merit therefore the greateſt attention from practitioners.

In treating of this diſorder, the cauſes which give riſe to it are to be firſt conſidered. They are in general as follow.

1. Wounds and other injuries of the urethra and bladder, from external violence, in whatever manner they may be produced.

In the old method of performing lithotomy by the apparatus major, the parts were ſo much bruiſed and lacerated, that the wound ſeldom healed kindly, and frequently terminated in fiſtulous ſores of the perinæum; but when the operation is well performed according to the preſent improved method, this is ſeldom the caſe. From ſome cauſe or other, however, it happens in a few inſtances, that the urine does not flow freely by the yard; and as it finds a ready paſſage by the wound, it continues to come off in this manner, till the edges of the ſore becoming callous, the diſorder in queſtion is produced. In ſome caſes

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of this nature, a direct communication is kept up between the neck of the bladder and the ſore; but in others, the urine paſſes firſt into the urethra, and from thence is diſcharged by the wound in the perinæum.

This diſeaſe is ſometimes the conſequence of inciſions made into the urethra, for the purpoſe of extracting ſtones lodged in it, when the wounds do not heal, but continue open and give vent to the urine which they ſometimes do for a conſiderable length of time.

2. Inflammation in any part of the urethra, by whatever cauſe it may be induced, if it terminates in an abſceſs, is very apt to corrode the membrane of this canal, and to produce a ſinuous opening, at which the urine is diſcharged along with pus. This ſpecies of the diſorder, we may remark, is not an unfrequent conſequence of virulent gonorrhœa: For when the inflammation ſpreads along the perinæum towards the anus, if it be not quickly removed by bloodletting and ſuch other means as are employed, it will be very apt to terminate in ſuppuration.

Abſceſſes which form originally in the ſoft parts about the anus, are alſo known to give riſe to it by communicating inflammation and ſtricture, terminating in ſuppuration, to the cellular ſubſtance connected with the urethra.

3. The ſeveral cauſes enumerated in the laſt Chapter, inducing obſtruction of the urethra, by impeding the free diſcharge of the urine, frequently give riſe to the diſeaſe now under conſideration: And accordingly we find that fiſtulous ſores in the perinæum are very commonly connected with an obſtructed ſtate of the urethra.

As the diſorder may be thus induced by a variety of cauſes, it is neceſſary to have theſe in view when we endeavour to accompliſh a cure. In order, however, to render this very perplexing branch of practice

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as obvious and ſimple as poſſible, it is neceſſary to remark, that the different cauſes we have enumerated tend to the production of the diſeaſe by two general effects only :

1. By the formation of a paſſage directly into the urethra or bladder, either by external violence or by the deſtruction of part of the urethra as a conſequence of ulcers ſeated in it, or of matter collected in abſceſſes tending to abrade its ſubſtance ; this, we ſuppoſe, may occur, independently of any obſtruction to the paſſage of the urine.

2. By the ſole influence of obſtructions in the urethra : Theſe, by putting a ſtop to the free evacuation of the urine, at firſt induce a fullneſs and tenſion of the urethra, which, if it be not ſuddenly removed by ſuch means as are employed, it very commonly terminates in a complete rupture of this canal.

In the treatment, therefore, of this diſorder, we are to be directed by one or other of theſe general effects ; and it is to be remarked, that in no diſeaſe is it of more importance to diſtinguiſh accurately between the cauſes tending to induce it. When the opening into the urethra has been produced by a previous obſtruction, no external application, nor any remedy directed to the ſyſtem in general, will have any effect ; while a proper and long continued uſe of the bougies, by removing the obſtruction, will very commonly accompliſh a cure : And on the other hand, when the diſorder has not originated from any obſtruction, but has been induced by a ſimple opening in the urethra, bougies are not only very unneceſſary, but frequently do a great deal of miſchief.—This, we muſt obſerve, is a diſtinction which is not ſo much attended to in practice as it ought to be. Affections of this kind are commonly treated with bougies only, whatever may have been the cauſe which at firſt induced them : But we ſhall ſoon make it appear that this muſt frequently prove prejudicial.

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In the cure of theſe diſorders, too, it is a matter of the firſt importance to diſtinguiſh between ſuch affections as are merely local, and thoſe that are evidently connected with ſome general diſorder of the ſyſtem. For however well our means of cure might be directed towards the topical management of the ſores, if the patient at the ſame time laboured under lues venerea, ſcrophula, or ſcurvy, no permanent cure could be expected, unleſs proper remedies were employed for the removal of theſe affections.

We ſhall now proceed upon the ſuppoſition, that the ſores are merely local, or that any general affection with which they may have been connected, is as much as poſſible removed; and we ſhall likewiſe ſuppoſe that the diſorder has been originally induced by ſome obſtruction in the urethra.—In ſuch circumſtances, if the diſorder has not been of long continuance, and if the parts, through which the opening runs that communicates with the urethra, are not much diſeaſed, the bougie is almoſt the only remedy that is neceſſary: By a proper and long continued uſe of bougies in the manner we have deſcribed in the laſt chapter, the obſtruction will in all probability be removed; at leaſt, I have as yet met with very few inſtances of the contrary: And as ſoon as this is effected, which will be known by the inſtrument paſſing in without any impediment, and by the urine flowing in a full ſtream when the orifice at the ſore is compreſſed, if this preternatural opening does not now in the courſe of a ſhort time heal of itſelf, it will be found to be prevented by its edges having become hard, and by their being covered as it were with a morbid production of the ſurrounding cuticle.

Till this obſtacle to the progreſs of the cure is removed, no advantage, it is evident, can be derived from any means to be employed. We are therefore to attempt the deſtruction of theſe callous edges of the ſore, as ſoon as it is found that the bougies, after removing

removing the obſtruction in the urethra, have not proved altogether effectual; and the method of doing it is this: The patient muſt be laid down upon a table, in nearly the ſame poſture as is uſed in the operation of the ſtone; and a ſtaff being introduced into the urethra, ſo as to paſs the opening at which the urine is diſcharged, it is in this ſituation to be held firm by an aſſiſtant; while the ſurgeon, introducing a ſmall probe at the external opening of the ſore, and cutting upon it in the direction of the ſinus, is thus to lay it open through its whole length, till it terminates either in the urethra, or, if neceſſary, in the bladder itſelf.

When more openings than one are diſcovered, they muſt all be laid open in the ſame manner. In ſome inſtances, there are two or three ſinuſes in the cellular membrane, leading from one opening in the urethra; but in others, there are as many openings in the urethra as there are ſinuſes or ſores outwardly. This, however, is not a frequent occurence: But it is a matter of little importance, as the ſame method of treatment anſwers equally well in both caſes; for whether the different ſinuſes originate from one common opening in the urethra, or not, they ought all to be laid completely open from one extremity to the other.

In general, this ſimple diviſion of the ſinuſes would prove ſufficient; but when any of the parts through which they run have become uncommonly hard, a ſmall portion of ſuch diſeaſed parts as lie moſt contiguous to the ſores may be removed by the ſcalpel. This, it may be obſerved, however, is not often neceſſary, as the inflammation and conſequent ſuppuration, induced by the diviſion of the parts affected, very commonly removes any ſlight degree of calloſity; but when the hardened parts are extenſive, and appear too conſiderable to be removed in the courſe of the ſubſequent ſuppuration, ſuch a propor-

tion of them ſhould be taken off by the ſcalpel as will not probably be removed in this manner. This, however, is a circumſtance upon which nothing deciſive can be ſaid; for the neceſſity of removing a portion of ſuch diſeaſed parts or not, and the quantity to be removed, muſt, in all ſuch caſes, be left to the judgment of the operator.

After all the ſinuſes have thus been freely divided, the ſtaff ſhould be withdrawn, and the divided parts ought to be gently ſeparated by the introduction of ſoft lint ſpread with any emollient ointment, in order to prevent their immediate reunion. But although it is neceſſary for this purpoſe to inſert ſome ſoft eaſy application between the lips of the wound, yet this ought to be done with much caution; for ſtuffing or cramming the ſores, as is ſometimes done, always does miſchief, and in ſome inſtances even renders all the other ſteps of the operation ineffectual. The ſores are now to be covered with a pledgit of emollient ointment; and proper compreſſes being applied over it, the T bandage ſhould be employed to ſuſtain the whole.

About twenty four hours after the operation, an emollient poultice ſhould be applied over the dreſſings; and as ſoon as a free ſuppuration is formed, the whole ſhould be removed, and light eaſy dreſſings ſhould be continued till the different ſores are healed by a proper adheſion of the parts at the bottom of each.

A very material part of the cure is found to conſiſt in the dreſſings being duly attended to. Indeed, regular and proper dreſſing is of ſo much importance, that without it all the previous ſteps of the operation will avail nothing in effecting a cure: And it is to this circumſtance chiefly, we are to attribute the ſuperior ſucceſs, which occurs in caſes of this kind, in private practice, over what is commonly obſerved in hoſpitals, where ſuch care and attention can ſeldom

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be obtained. Even in private there is much difference met with in the cure of fores of this nature: I have known inſtances of fiſtulous openings in the perinæum of a very bad appearance, completely cured by one practitioner, when ſeveral others had failed entirely, owing in a great meaſure to the difference of attention with which they were treated.

I have not yet mentioned the uſe of the bougie, nor of the catheter, as a neceſſary part of the treatment ſubſequent to the operation: And in this I ſhall poſſibly appear to be ſingular; for, in all caſes of this kind, we are commonly directed to keep a bougie conſtantly inſerted from the time of the operation, excepting at the time of voiding urine, when a catheter is adviſed to be employed; and in order to avoid the trouble of withdrawing the one and inſerting the other, ſome practitioners have adviſed a flexible catheter to be kept in the urethra from the firſt.

The advantages ſuppoſed to accrue from the uſe of the bougie, is the prevention of any undue contraction of the urethra; and by the catheter it is intended to prevent the urine from paſſing out at the ſore during the cure.—Theſe motives, for the uſe of both the one and the other, are plauſible; and they have accordingly been very generally adopted.—I am free to confeſs, too, that, following the example of others, I have often, in caſes of this kind, employed both the catheter and bougie; but I cannot ſay that I ever did ſo with any advantage, and in many inſtances I think I have ſeen them do much harm. For, in every caſe in which they are uſed, they keep the urethra too much diſtended for admitting of an eaſy cure of the ſores; and if the catheter be not inſerted ſo far as to paſs fully into the bladder, part of the urine, in coming off, almoſt conſtantly paſſes between it and the urethra ſo as to get acceſs to the wound, and in this manner has the ſame influence upon the ſore as if no catheter was uſed: And again, if a catheter is paſſed

entirely

entirely into the bladder, and is preſerved in this ſituation for any conſiderable time, it almoſt conſtantly does harm, by inducing pain, inflammation, and ſwelling about the neck of the bladder.

But whoever will attempt a contrary practice, and will endeavour to cure affections of this nature without any aid from theſe inſtruments, will ſoon find that they are not neceſſary; and that the wound in the urethra from the operation we have deſcribed, is in general much more eaſily cured, without the aſſiſtance either of bougies or of the catheter, than when they are employed; for, inſtead of forwarding the cicatrization of the ſores, they uniformly tend to retard it, by frequently tearing open ſuch adheſions, as nature, if left to herſelf, would have made altogether complete.

This, we muſt again remark, is a point of much importance, and merits the utmoſt attention of practitioners. The uſe of the bougie, in all ſuch caſes, is at preſent ſo univerſal, that the cure of a fiſtula in perinæo by an operation, is almoſt never attempted but where bougies are at the ſame time employed; but, from much experience in this branch, I am now perfectly ſatisfied, that many more cures would be accompliſhed if the bougie and catheter were both laid aſide.

In real obſtructions of the urethra, bougies, as we have ſaid, are almoſt the only remedy to be depended on; but, ſo far as I have ſeen, they are of no farther uſe after theſe obſtructions are removed; when, therefore, a fiſtulous opening remains after the removal of the obſtructions, the operation we have deſcribed ought alone to be depended on; and in this part of the cure bougies ought never to be employed.

But it is ſaid by thoſe who patroniſe the uſe of the bougie and of the catheter, that if the urine be allowed to paſs out by the ſore, the cure will be thereby, if not altogether interrupted, at leaſt much retarded.

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To this it may be anſwered, That after the operation of lithotomy, we do not find the cure retarded, although the urine comes at all times into immediate contact with, and during the firſt days after the operation paſſes conſtantly off by, the wound. In what manner this is effected, I ſhall not at preſent determine; but that the fact is ſo, no practitioner will deny: And from all the experience I have had in theſe matters, openings in any other part of the urethra require as little aſſiſtance from the catheter, as they do in that part of it which is divided by the operation of lithotomy; and every lithotomiſt, I believe, would ſpurn at the idea of keeping a catheter conſtantly in the bladder after this operation, in order to prevent the urine from paſſing off by the wound.

After the operation of lithotomy, it happens, indeed, in a few caſes, that a contraction of the urethra is produced by the cicatrix of the ſore, and in ſuch inſtances, after the parts are firmly united, bougies are ſometimes of uſe, by effecting a diſtention of the ſtricture: And in a few caſes, too, where the ſore is prevented from healing, by the urine continuing to paſs off by the wound in conſequence of the formation of ſtrictures or adheſions in the urethra, the bougie is employed with advantage even during the progreſs of the cure. But theſe are rare occurrences, and no practitioner of experience ever thinks it right to have recourſe to bougies, till the preſence of ſome obſtruction renders them altogether neceſſary; and in the ſame manner they ought never to be employed in the operation we have been deſcribing, till the propriety of uſing them is pointed out by the formation of ſome degree of obſtruction.

When the parts compoſing the perinæum have become hard and otherwiſe diſeaſed, before any operation ſuch as we have deſcribed is put in practice, we are commonly directed to a long and continued uſe of poultices; of mercurial frictions; and the uſe of reſolvent

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gum plasters. So far, however, as I have ever seen, little or no advantage is derived from these remedies; for any suppuration expected from their use, is, in general, very partial, and has seldom much effect in removing, or even in relieving, the disorder for which it is induced.

And, again, when the hardened parts are extensive, and when no relief is obtained from the discutient remedies we have mentioned, we are in general directed to cut them entirely away with a scalpel. There is not, however, the least necessity for such a measure, for although it may be proper to remove the edges of the sores when they have become callous, there is never any good cause for extirpating every part that is become hard. This would frequently be a very cruel operation; and as it could seldom be productive of any advantage, it ought rarely, if ever, to be put in practice.

When, again, a preternatural opening is found in the urethra, either by external violence or by the abrasion of its substance by abscesses seated in it, a different kind of practice becomes necessary.—When an abscess in the perinæum, or in any part of the urethra, has been the cause of the disorder, much attention should be given to a free discharge of the matter; every part of the cellular substance in which it is found to lodge, ought to be laid open; and any inflammatory tumor that has not suppurated freely should be treated with warm fomentations and poultices.—In this manner many such affections, which if neglected would terminate in much distress, may be brought to heal; but when even by these means the sores do not unite, but continue to discharge matter, and especially when they become fistulous, the method of treatment we have formerly pointed out must be likewise employed here.

Disorders of this kind induced by wounds of the urethra, require a similar method of cure.—By the removal

removal of extraneous matter, and by the uſe of poultices to abate inflammation, a cure will frequently be effected without any other aſſiſtance; but, when the ſtate of the ſores requires it, they ought to be laid open, and treated in every reſpect in the manner we have already directed.

The moſt diſtreſſing variety of this diſorder is that in which the urine paſſes off directly from the body of the bladder without communicating with the urethra. This ſpecies of the diſeaſe, we may remark, is readily diſtinguiſhed from the other by the urine drilling off inſenſibly and at all times; whereas, when the external opening does not communicate directly with the bladder, and when the urine paſſes firſt through part of the urethra, the patient has commonly the power of retention in full perfection; a circumſtance which renders his ſituation much more comfortable than when the urine is conſtantly paſſing off. —But although this variety of the diſorder is eaſily diſtinguiſhed from the other, it cannot be ſo readily cured; for in ſuch caſes, the ſinuſes from whence the urine is diſcharged communicate directly with the bladder, and nothing has any effect in removing them but laying them open to the very bottom.

When, therefore, a patient labouring under this diſorder finds his ſituation to be ſo diſtreſſing as to render the pain and riſk of ſuch an operation an eligible alternative, it ought undoubtedly to be employed as the only means from which any probable chance of relief is to be expected.

As the intention and principle of this operation are the ſame as of that in which the urethra only is concerned, all that need be ſaid with reſpect to the mode of performing it, is, that a ſtaff ſhould be introduced into the bladder; the different ſinuſes ſhould be laid freely open to the bottom; any calloſities of their edges ſhould be removed to ſuch a depth as can be done with ſafety; and the wounds thus produced

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ought to be treated with light eaſy dreſſings, ſuch as we have already adviſed.

In this manner, a great proportion of all who are afflicted with ſuch diſorders may be effectually cured, provided the means we have recommended are employed in due time, and are properly perſiſted in: But in long continued fiſtulous ſores of theſe parts, where the ſurrounding cellular membrane has become much hardened, and otherwiſe diſeaſed; and eſpecially, when the ſyſtem is tainted either with ſcurvy, ſcrophula, or lues venerea; it muſt be acknowledged that no means with which we are acquainted will prove at all times ſucceſsful.

ERRATA. [From the Britiſh copy.]

PAGE 100. 6th line from bottom, read *Plate V.*
317. line 12. For *Plate I.* read *Plate XII.*
362. line 12. For *Plate XVIII.* read *Plate XVII.*

EXPLANATION

EXPLANATION OF THE PLATES.

PLATE I.

[Oppoſite to page 20.]

Fig. 1. A FORM of hook, commonly termed a tenaculum, for the purpoſe of pulling out bleeding veſſels to be tied by ligatures.

Fig. 2, and 3. Two needles of a different curve from thoſe in ordinary uſe. The curvatures being altogether on their fore parts, and the handles perfectly ſtraight, they are thereby more eaſily managed than the others, particularly in deep wounds. Fig. 5, and 6, repreſent two needles of the uſual form; but neither theſe nor the other two have an edge on their concave parts. They are made ſomewhat round like a lancet, both on their convex and concave ſides; which adds to their ſtrength, and makes them enter with more eaſe than the others. I have long made uſe of thoſe needles, and whoever employs them will find them preferable in every reſpect to the others.

Figs. 4, and 7. Two ſtraight needles for ſutures of the inteſtines and other delicate membranous parts.

All theſe needles are repreſented of the full ſize.

A number of inſtruments have been contrived for holding the needles when they are to be employed in deep wounds. The Porteaiguille repreſented in Plate II, will anſwer this purpoſe as well as any other; but inſtruments of this kind cannot be often needed.

PLATE II.

[Oppoſite to page 25.]

Fig. 1. A Porteaiguille mentioned in p. 25.
A. A. The handles of the inſtrument.

B. A groove for receiving the pins uſed in the twiſted ſuture.

This inſtrument is commonly made with a ſlider for fixing the handles after the pins are inſerted into the groove; but as this always proves troubleſome to the operator, and is not in any degree neceſſary, it is here purpoſely omitted.

Fig. 2, 3, and 4, are different ſizes of pins uſed in the twiſted ſuture deſcribed p. 23.

And fig. 5, is a flat needle ſometimes found uſeful in ſtitching blood veſſels that lie between contiguous bones.

All the inſtruments in this plate are repreſented of their full ſize.

PLATE III.

[Oppoſite to page 31.]

Fig. 1. A ſcrew tourniquet deſcribed, p. 30. Every part of the inſtrument is here repreſented of the full ſize: It may be made either of braſs or ſteel; and the ſtrap connected with it ought to be of very firm materials, at leaſt an inch broad, and of a length ſufficient to paſs fully round the largeſt circumference of any of the extremities.

Fig. 2. A ſpring phleme deſcribed, p. 56. This inſtrument is alſo repreſented of the full ſize.

PLATE IV.

[Oppoſite to page 56.]

Fig. 1, and 2, Two ſcalpels of the beſt form, either for the anatomiſt or ſurgeon. Fig. 1, is of a ſize large enough for any operation; and fig. 2, is of a very uſeful ſize for operations about the eyes, mouth, and other parts where a larger inſtrument proves inconvenient.

Fig. 3, and 4. The beſt form of lancet for the operation of bloodletting, deſcribed p. 57, fig. 3, is

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of a full ſize for any purpoſe of this kind ; and fig. 4, is for the ſmall veins of infants.

Fig. 5, repreſents the broad ſhouldered lancet in ordinary uſe ; but which, from its figure, is evidently ill ſuited for the nice operation of venæſection.

Plate V.

[Oppoſite to page 100.]

Fig. 1. A ſcarificator with ſixteen lancets, *A*, a cubical braſs box, in which the blades of the lancets firmly fixed on an axis are included. *B*, a lever for bending a ſpring with which the axis and its lancets are connected. *C*, a button or head of a ſcrew nail connected with a catch for ſecuring the ſpring in a bent ſtate : On the ſpring being bent by means of the lever *B*, and the flat part of the inſtrument *D D* being placed upon the part to be ſcarified, the button *C* is then to be preſſed upon till the ſpring is unbent, which forces the lancets into the parts they are placed upon, to the depth at which they have been previouſly ſet ; and the flat covering of the box *D D* being moveable, ſerves to regulate the length of the lancets which paſs through it.

Fig. 3. A cupping glaſs with a mouth of an oval form ; and fig. 4, repreſents one of the ordinary round kind.

Fig. 2. A ſtrong curved needle, with a round though ſomewhat ſharp point. This inſtrument anſwers the purpoſe better than any yet contrived, for introducing ligatures below the artery, in the operation for the aneuriſm ; and below the ſpermatic cord, in the operation of caſtration.

All the inſtruments of this plate are repreſented of a proper ſize for uſe.

Plate VI.

[Oppoſite to page 162.]

Fig. 1, 2. and 3, repreſent different parts of a machine for injecting tobacco ſmoke by the anus.

Fig. 1.

Fig. 1. A braſs box for containing the burning tobacco. The mark *A* is a bottom or diviſion in the inſide of the box, perforated with ſmall holes to admit the paſſage of the ſmoke to the extremity of the box *B*; which, by a male ſcrew, is adapted to a braſs tube, fig. 3, at *D*, which is again fitted to an elaſtic leather pipe *E*, terminated by a common glyſter pipe *F*. The pipe *E* is made of waxed leather, protected by braſs wire rolled ſpirally round it from one extremity to the other.

Fig. 2, repreſents the covering of the box, fig. 1, to which it muſt be exactly fitted. *G*, a diviſion of thin braſs, perforated with a number of ſmall holes for admitting the paſſage of the air from a pair of bellows fitted to the opening *H*.

Fig. 3. The inſtrument completely fitted up on a ſmall ſcale. *I* a pair of double bellows, whoſe tube *K* is fitted by a ſcrew to an opening in the cover of the box *L*, which again is terminated by the braſs tube *M*, the leather pipe *N*, and the ordinary glyſter pipe *O*.

The box *L* being filled with burning tobacco, and the glyſter pipe *O* being inſerted into the anus, by working the bellows *I*, any neceſſary quantity of ſmoke may be very quickly thrown up.

It is ſcarcely neceſſary to obſerve, that all the parts of this machine ought to be exactly fitted to one another, with a view to prevent effectually the eſcape of ſmoke at any of the joints.

Bellows of the ordinary ſize anſwer very well for this purpoſe; and are preferable to thoſe of a ſmaller ſize, as being better calculated for injecting the ſmoke quickly. The braſs box for the tobacco ſhould be about an inch and half in diameter, by three inches in length from the brim to the bottom; the braſs tube connected with the box ſhould be ſix inches in length, by a quarter of an inch in diameter. The leather pipe ought to be of nearly the ſame diameter

with

with the tube, and about two feet and an half in length. When of this length, it is eaſier managed than when ſhorter; and it ſerves more effectually to cool the ſmoke before it is thrown into the bowels.

The glyſter pipe at the end of the leather pipe ought to be ſomewhat larger and wider than thoſe in ordinary uſe.

Plate VII.

[Oppoſite to page 163.]

Fig. 1. Another inſtrument for the purpoſe of injecting tobacco ſmoke, originally invented by the celebrated profeſſor Gaubius. The principal difference between this and the inſtrument repreſented in Plate VI, is, that in this the tobacco box *A*, is fitted to the air hole of the bellows; ſo that in working the bellows, the air with which they are ſupplied entering in at the openings *B*, the ſmoke of the burning tobacco muſt accordingly paſs through them; and from the bellows it is thrown into the other parts of the inſtrument, and in that manner is tranſmitted to the inteſtines.

The other inſtrument repreſented in Plate VI, is wrought with more eaſe than the one here delineated.

Fig. 2. A crooked biſtoury, with a blunt or probe point. The curve here repreſented is much leſs than is uſually given to this inſtrument, and the blade is alſo much narrower: It ought, indeed, to be altogether ſtraight, excepting a very ſlight curvature towards its point.

This biſtoury is well calculated for dividing the ſtricture in caſes of hernia; for opening ſinuſes in every ſituation; and particularly for dividing the rectum in the operation of the fiſtula in ano.

Fig. 3. A bandage for compreſſing the temporal artery, either after the operation of Arteriotomy, or in accidental diviſions of that artery. It is made of well tempered ſpring ſteel, covered with ſoft leather,

and

and of the ſame ſtrength as is uſed for the truſs of a hernia. The wound being dreſſed, and a ſmall compreſs of linen being applied over it, the limbs of the inſtrument are to be opened, and applied over the back part of the head, ſo that their extremities *B D* may reſt upon the temples, and one of them be made to reſt exactly upon a compreſs covering the wound. If the inſtrument is made of proper metal, and of ſufficient ſtrength, it will remain exactly upon the part on which it is firſt placed without any aſſiſtance; but, to prevent its being rubbed off by accident, it is here furniſhed with a buckle and ſtrap *A C*, by which it may be firmly fixed by drawing them tight upon the forehead.

This inſtrument ſhould be about three quarters of an inch broad; and from twelve to fourteen inches in length will anſwer for the dimenſions of any head.

I once had a ſcrew with a button adapted to this bandage, the button being made to preſs upon the divided artery; but the compreſs of linen here recommended, anſwers the purpoſe better, and is eaſier to the patient: Bandages made of linen or of other materials of a yielding nature, do not anſwer ſo well as thoſe of ſpring ſteel, which always remain with more certainty on the ſpot they are firſt placed upon.

Plate VIII.

[Oppoſite to page 173.]

Fig. 1. A ſpring truſs for an inguinal or femoral hernia of the right ſide. *A*, the bolſter or pad for preſſing upon the opening at which the parts have been accuſtomed to protrude. *B*, a ſtrap with holes in it for fixing upon the knobs on the back part of the pad. *C*, a ſtrap hanging down from the back part of the bandage, to be paſſed between the legs of the patient, and to be alſo fixed upon the knobs of the pad by the holes in its extremity.

This

This ſtrap is intended to fix the bandage firmly in its ſituation; but if the bandage is properly fitted to the parts, and if the ſteel ſpring of which it is compoſed is ſufficiently elaſtic, there is no neceſſity for the intervention of this ſtrap, which always frets and galls the parts upon which it is made to paſs.

Fig. 2, repreſents a bandage of this kind for the left ſide with no back ſtrap.

Fig. 4, repreſents a double bandage of the ſame kind for a hernia on each ſide, with two back ſtraps connected with it.

The ſteel of which theſe bandages are made ſhould be covered with thin ſoft leather, properly ſtuffed with wool or flannel, in order to prevent the parts from fretting by the preſſure neceſſarily produced upon them. The pads ought to be broader than they are generally made, with a prominence or ſlight elevation in the middle, while their ſides are made perfectly flat. Of this conſtruction they apply with much more exactneſs, and ſit more firmly on the parts than when altogether round as they are commonly made, without any flatneſs on their ſides.

Fig. 3, repreſents a bandage for umbilical ruptures. *A*, a ſteel ſpring to be applied upon the umbilicus after the hernia has been reduced, and to be retained in that ſituation by the bandage *B*; which, by means of the ſtrap *CCC* and the buckles *DDD*, may be kept at any degree of tightneſs. *EE*, two ſtraps for paſſing over the patient's ſhoulders; and *F* a ſtrap for paſſing between the legs, the whole to be fixed upon knobs on the back part of the bandage oppoſite to the ſpring *A*. By means of theſe buckles and ſtraps the bandage may be preſerved very firmly in its ſituation.

The belt *B* ſhould be five or ſix inches broad, and the ſteel ſpring *A* ſhould be of a ſize proportioned to the opening it is intended to preſs upon.

All

All the parts of the bandage ſhould be made of ſoft leather, lined with flannel or cotton.*

PLATE IX.

[Oppoſite to page 210.]

Fig. 1. A peſſary for the prevention of herniæ in the vagina. This peſſary conſiſts of a conical tube of ivory, ſilver, or gold, with a cord at its extremity, for the purpoſe of withdrawing it when neceſſary. The protruded parts being reduced, and this cone being rubbed over with oil, is to be introduced into the vagina, by which any farther deſcents may in general be prevented.

Peſſaries for this purpoſe have been formed of ſpring ſteel; but the ruſt which inſtruments of that metal are apt to contract renders them very unfit for ſuch uſes.

Fig. 2. A hook deſcribed p. 208, for enlarging the opening in the foramen ovale in caſes of hernia of that part. This hook was originally propoſed by Mr. Arnaud, a French author, for dilating the paſſage at which the parts protrude in caſes of crural hernia.

Fig. 3. A director open at the extremity, deſcribed p. 180, for the purpoſe of laying open the ſac in the operation of the bubonocele.

Fig. 4. A ſilver canula for introducing into the urethra after the operation of amputating the penis. The ſtrings with which it is furniſhed are intended to fix it to a circular bandage which ought to paſs round the patient's body.

PLATE X.

[Oppoſite to page 232.]

Fig. 1. A trocar of a proper ſize for evacuating the contents of an encyſted hydrocele. By the flatneſs

* The ſpring here repreſented is taken from a figure repreſented by the late Dr. Munro, in his Treatiſe on that ſubject. See his works in 4to.

neſs of its form, and its point being of the lancet kind, this inſtrument penetrates the cyſt with great eaſe; and can thereby be uſed with more ſafety than the ordinary form of this inſtrument.

The point of the perforator is commonly made much longer than is neceſſary. It ought not to paſs more than the fifth or ſixth part of an inch from the extremity of the canula; of this length it anſwers equally well as when the point is longer; and it is not ſo apt to wound the teſtis on being introduced into the cavity of the tunica vaginalis.

Fig. 2. A trocar, the invention of Mr. André. Fig. 3. The canula of this inſtrument, formed of two hollow plates of elaſtic ſteel, firmly united together at their larger extremities by two ſcrew nails. The tube formed by theſe two hollow plates is of ſuch a ſize as to allow the perforator, fig. 4, to be puſhed into it with very little force; and the elaſticity of the plates, which admits of their yielding to this paſſage of the perforator, enables them to return inſtantly to form the ſame ſize of tube, as ſoon as the large extremity of the inſtrument *A* has fairly paſſed the extremity of the plates.

The point of the perforator with a ſmall portion of the extremity of the tube being puſhed into the vaginal coat, the perforator is to be then withdrawn, which when the inſtrument is properly made may be done without much force.

The advantage which this inſtrument is ſuppoſed to have over any trocar of a different form, is, that the point of the perforator making a larger opening than is juſt neceſſary for the paſſage of the canula, the latter is thereby made to enter with more eaſe than it does in the uſual form of the inſtrument.

But although this invention of Mr. André's is neat and ingenious, it does not appear to be very neceſſary; for, when the other form of inſtrument is well finiſhed, and the ſilver at the extremity of the

canula is made very thin and properly fitted to the perforator, it enters with a great deal of eaſe. The canula of Mr. André's inſtrument has this diſadvantage too, that being made of fine poliſhed ſteel, it is almoſt impoſſible to render it ſo dry after every time it is uſed, as to prevent it from ſuffering with ruſt, at the part where the two plates are fixed together by the ſcrew nails.

Plate XI.

[Oppoſite to page 295.]

Fig. 1, and 2. Different parts of an inſtrument deſcribed p. 295 for performing the operation of phymoſis.

Fig. 3. The two parts of the inſtrument connected and ready for uſe.

Fig. 4. A large impoſthume lancet.

Plate XII.

[Oppoſite to page 317.]

Fig. 1. Repreſents a common ſtaff for the purpoſe of ſounding.

Fig. 2. A grooved ſtaff for the operation of lithotomy, with the groove on one ſide. This improvement was ſuggeſted for the purpoſe of paſſing the gorget more eaſily into the bladder than when the groove is on the convex part of the inſtrument: But the uſual form of the ſtaff is found to conduct the gorget with much eaſe; ſo that this alteration of it has not been generally adopted.

Fig. 3. A common ſtaff of the uſual form, with the groove on the convex part of it.

The curvature we have here given to the ſtaff has by experience been found to be more proper than any other: There is no neceſſity for that degree of convexity which is generally given to it; the form here repreſented is introduced with more eaſe;

and

and it does not injure the urethra, which thoſe with a greater degree of curvature always do.

A ſtaff for a full grown male ſubject ſhould be twelve inches long, beſides the handle; and for children of ſeven years and under, they ſhould be from ſeven to nine inches long.

PLATE XIII.

[Oppoſite to page 350.]

Fig. 1. A ſide view of the cutting director deſcribed in page 350. This inſtrument is here repreſented of a full ſize for the largeſt adult, viz. five inches from *A* to *B*, and three inches from *B* to *C*.

Fig. 2, repreſents a front view of the ſame inſtrument.

Fig. 3, affords a back view of it; and fig. 4, a tranſverſe ſection of it.

This director, in the grooved part of it, ſhould be exactly three eighths of an inch broad, viz. from *D* to *E*; and the cutting part of it, from *F* to *G*, ſhould meaſure nearly an inch. The beak of the inſtrument ſhould be exactly fitted to the groove of the ſtaff with which it is to be uſed.

In order to obtain a free paſſage for the ſtone, it has been propoſed to increaſe the breadth of the cutting part of Mr. Hawkins's gorget to a great extent: By ſome, it has even been ſaid that a couple of inches may be added to it. This, however, proceeds from inattention to the anatomy of the parts concerned in the operation; for that part of the urethra through which the gorget paſſes to the bladder, is ſo much confined by the contiguous bones, that it is abſolutely impoſſible to introduce a gorget of this ſize into it in a proper direction. The proſtate gland ought, in the operation of lithotomy, to be divided in a horizontal lateral direction. Now, this cannot be done by an inſtrument of the breadth we have mentioned. But, even although it were eaſily practicable, there

there is no neceſſity for ſuch an extenſive wound as this inſtrument would make. We have formerly ſaid, that nothing ſhould be left for the director or gorget to divide but the proſtate gland, together with a very ſmall portion of the neck of the bladder; and as an inſtrument ſuch as we have here delineated effects this in the moſt complete manner, there is no neceſſity whatever for one of a greater breadth.

The back part of the cutting director being conſiderably narrower than the common gorget, it ought to be made of a ſufficient thickneſs, in order to overcome any reſiſtance it may meet with in paſſing into the bladder. The tranſverſe ſection, fig. 4, ſhows the ſtrength of it.

For children from three to ſeven years of age, this inſtrument ſhould not exceed three inches in length; and one of four inches will anſwer for every age above this to the twentieth year.

The cutting edge of this director, as well as the cutting part of the gorget in Plate XIV, is here repreſented upon the right ſide of the inſtrument, by which the wound in the operation of lithotomy is made in the left ſide of the patient: But for a ſurgeon who operates with his left hand this muſt be reverſed, ſo as to have the cut made in the right ſide of the perinæum.

As this director has never been before mentioned to the publick, I have given a more particular deſcription of it than would otherwiſe be neceſſary.

Plate XIV.

[Oppoſite to page 353.]

Fig. 1. The cutting gorget of Mr. Hawkins, with the edge of it made to expand more than the uſual form of it, by which it divides the proſtate gland more freely.

The figure is of full ſize for the largeſt adults: From *A* to *B* ſhould meaſure five inches and a half,

and

and from *B* to *C* nearly three inches. This inſtrument at the wideſt part of it meaſures one inch, and contracts in a gradual manner to the point: The beak ſhould be exactly adapted to the grooves of the ſtaffs with which it is uſed; and ſhould be turned a little forward, inſtead of being perfectly ſtraight or turned back as is ſometimes the caſe: By this means it is carried with more ſteadineſs along the groove of the ſtaff than can otherwiſe be done. In page 350, we have mentioned at full length the objections which occur to the uſe of the gorget, and the reaſons which induce us to conſider the cutting director in Plate XIII, as a preferable inſtrument.

Fig. 2. A female catheter. This inſtrument is repreſented ſtraight, as being more eaſily introduced when of this form than when much crooked: A ſound for females, however, ſhould have a ſmall curvature, as being better adapted for diſcovering a ſtone in the bladder than a ſtraight ſtaff. A grooved ſtaff of this form is repreſented in fig. 3.

PLATE XV.

[Oppoſite to page 354.]

Fig. 1. Is an improvement of the gorget by Dr. Munro. It conſiſts of a common gorget *AB*, with a blunt gorget *CD* fitted to it: The nail *E* fixed in the cutting gorget being made to paſs through the ſlit in the blunt gorget *F*, the latter is thus made to run eaſily upon it. In uſing this inſtrument, the blunt gorget muſt be pulled back, ſo as to admit of all the cutting part of the other to project before it: And as ſoon as it has reached the bladder, the blunt gorget ſhould be puſhed forward; by which means the contiguous parts are effectually protected from farther injury, as the ſides of the blunt gorget ſhould be made conſiderably deeper, ſo as to project over the cutting edges of the other.

This

This is an ingenious contrivance; and it will anſwer the purpoſe effectually, of protecting the ſurrounding parts while the inſtrument is withdrawing; a circumſtance of much importance, and not always duly attended to.

Fig. 2. A male catheter of ſilver. The ſmall holes near the extremity of this inſtrument anſwer better than a ſlit on each ſide of it, as with theſe it does not ſo readily become entangled with the urethra. Catheters have likewiſe been made of other materials, namely, of leather, and of flexible twine rolled into the form of a tube and covered with bougie plaſter; and of late a very neat invention of this kind has appeared, prepared of the reſina elaſtica. Theſe laſt are particularly recommended for remaining in the urethra in caſes where bougies were formerly employed; but, from the trials we have made of them, they do not ſeem to anſwer when long inſerted at once, as they turn ſoft and loſe their elaſticity entirely.

Fig. 3. An inſtrument I have named a Searcher, mentioned page 361.—In the operation of lithotomy it frequently happens, that the ſtone is not readily felt by the forceps. When it is diſcovered by the other means we have adviſed, it may frequently be found by introducing this inſtrument at the wound: Which being of a conſiderable thickneſs, anſwers better for this purpoſe than a common ſound; and when once the ſtone is diſcovered, the ſearcher ought to be preſerved in cloſe contact with it with one hand, while the forceps is conducted to the ſtone by means of it with the other. In this manner, ſtones may be diſcovered, which otherwiſe might eſcape the ordinary means of ſearching.—This inſtrument ſhould be made of ſteel, and ſhould be nine or ten inches in length.

PLATE XVI.

[Oppoſite to page 355.]

Fig. 1, and 2. Forceps of different ſizes for extracting ſtones from the bladder.—For a full grown adult

adult they ſhould be ten inches long and proportionally ſtrong. Every operator ought to be furniſhed with three or four ſizes from thoſe of ten inches to ſuch as are not more than ſeven. We have already deſired, that the blades of the forceps may not meet when they are ſhut; for by doing ſo, they would be apt to lay hold of the bladder; and for the ſame reaſon, their teeth ought not to be very long. If they have merely a roughneſs, it anſwers the purpoſe ſufficiently of fixing the ſtone; and this is all the advantage to be derived from it. Even this roughneſs ſhould be confined to within an inch of the point of the forceps; for when it is made to reach nearer the joint, ſmall ſtones are apt to fix in this part, and to dilate the blades of the inſtrument much more than otherwiſe it would do.

Fig. 3. Forceps with a ſmall degree of curvature. When the forceps of the uſual form do not eaſily lay hold of a ſtone, ſuch as are ſomewhat crooked will ſometimes meet with it: In general, however, the ſtraight forceps anſwers all the purpoſes of the other; and as ſtones, when laid hold of, are always more eaſily extracted with the ſtraight forceps, they ſhould commonly be preferred.

Plate XVII.

[Oppoſite to page 360.]

In the chapter on Lithotomy, we have taken different opportunities of mentioning the riſk attending the extraction of a large ſtone; and when a ſtone is found to be ſo very large as to give cauſe to ſuſpect that it cannot be extracted but with much difficulty, we have given it as our opinion that it ſhould rather be broke into different pieces: For this purpoſe various inſtruments have been propoſed.—Fig. 1, repreſents forceps with long teeth, by which almoſt any ſtone may be broke.—By the ſcrew and lever connected with it, a much greater force may indeed be

be employed than will commonly be neceſſary.—Theſe forceps ſhould be about twelve inches in length, and of a ſufficient firmneſs in every part, particularly in the joint, for bearing any force that may be needed.

Fig. 2. A ſcoop for extracting ſuch ſmall pieces of ſtone as cannot be taken out with the common forceps.

Fig. 3. A ſilver canula for introducing into the wound after the operation of lithotomy, for compreſſing ſuch arteries as lie too deep to be tied by ligatures. This tube ſhould be of a flat form: For a full grown adult, an inch broad and four inches in length; and before being introduced, it ſhould be covered with ſeveral plies of ſoft old linen. There ſhould be two holes in the brim of the inſtrument for connecting it by means of two pieces of tape to a circular bandage round the body.

Plate XVIII.

[Oppoſite to page 370.]

Fig. 1, and 2. Different views of Frere Coſme's inſtrument for the operation of lithotomy. Fig. 1, repreſents the inſtrument ſhut; and fig. 2, gives a view of it open.—The handle *A* with which the nitches *B* are connected, being kept in the ſituation repreſented in fig. 1, by the ſpring *C* being fixed in one of the nitches, the knife is thus preſerved ſhut. But when the ſpring *C* is preſſed upon, ſo as to raiſe it out of the nitch, as the handle *A* is made to move upon a pivot, it may now be turned; and the projecting part of it *D* being turned fully round, if preſſure be now applied to *E*, it will raiſe the knife *F*, with which it is connected, to the elevation here repreſented.—The point *G* ſhould be made blunt and round, ſo as to run with eaſe and freedom in the groove of a ſtaff. The length of this inſtrument, including the handle, ſhould be ten inches.

The method of uſing it is as follows: All the previous ſteps of the operation being finiſhed, and the

the urethra being cut in the manner we have directed, the beak of the inſtrument *C* is to be conveyed into the groove of the ſtaff, and while ſhut is to be puſhed into the bladder. The ſtaff is now to be withdrawn; and preſſure being applied to *E*, ſo as to elevate the knife *F*, it is now to be drawn out in ſuch a direction as to divide the proſtate gland laterally, when the forceps may be either introduced by running them in upon the fore finger of the left hand, or upon a blunt gorget employed for the purpoſe.

Various inſtruments of this kind have been invented; but the one here delineated is the moſt ſimple, and in every reſpect, indeed, the beſt of any we have met with. As the operation is ſtill performed with it in different parts of Europe, particularly in France, we think it right to give a repreſentation of it, but we do not by any means recommend it.—The objections which occur to it are theſe: Although by the form of the handle the blade or cutting part of the inſtrument may be elevated to any neceſſary degree, yet this does not enſure the formation of a wound of a fixed and determined ſize. It has indeed been aſſerted by thoſe who think favourably of this inſtrument, that a wound of any determined ſize may be made with it: But this is by no means the caſe; and whoever will give it a trial will find, that the wound produced by it varies in ſize in every two that are cut with it; and this, even with the blade at the ſame degree of elevation; for the cutting part of it is at ſuch a diſtance from the handle, that it is impoſſible for a ſurgeon to withdraw it always with ſuch ſteadineſs as to cut uniformly in the ſame direction; and if in one caſe it is made to preſs in any degree more to one ſide than in another, the wound formed by it may not only be of a different ſize, but very different parts may be cut by it.

But the moſt material objection to this inſtrument is, that it is very apt to injure more of the bladder

than ought to be cut. It is the proſtate gland and a ſmall portion of the neck of the bladder only which ſhould be divided by this knife; but as it is always neceſſary to inſert the point of it far into the bladder before this can be done, the ſides and even fundus of it are in this manner very apt to ſuffer.

The only advantage which this inſtrument is ſuppoſed to poſſeſs over the cutting gorget or director is, that being inſerted ſhut, and withdrawn open, only one cut is made in the parts through which it is made to paſs; whereas, it is alleged, that, in the uſual method of employing the gorget or director, one inciſion is formed by the introduction of the inſtrument, and another when it is withdrawn. But, by attending to the directions we have given in the chapter on Lithotomy, this inconvenience commonly attributed to the gorget, and conſequently to the director, may be always avoided; and as theſe inſtruments form a more free cut than the lithotome cachée, and as they do not ſo readily injure any part of the bladder which ought not to be cut, they ſhould therefore be preferred.

Fig. 3. Forceps with a ſcrew *H* paſſing through their handles.—When a ſtone is properly fixed in the forceps, various inventions have been propoſed for preſerving them in the ſame ſtate; but the one we have here repreſented is the beſt and the moſt ſimple of any that has been mentioned.

Plate XIX.

[Oppoſite to page 388.]

Fig. 1. A jugum which anſwers the purpoſe of compreſſing the penis very completely, and it ſits upon the parts without producing any pain or uneaſineſs. It conſiſts of a piece of elaſtic ſteel lined with velvet or ſoft flannel. By means of the ſcrew *A*, it can be made wide or ſtrait at pleaſure; and the cuſhion *B* being placed upon the urethra, any neceſſary degree of preſſure may be produced upon it, by turning

ing the ſcrew with which the cuſhion is connected. By means of this cuſhion and ſcrew, the preſſure is chiefly confined to the urethra; ſo that the circulation is ſcarcely interrupted through the reſt of the penis.

Fig. 2. A receptacle for the urine mentioned in page 389. It may be made either of tin or ſilver, or any other metal. It is ſomewhat convex on one ſide, with a concavity on the oppoſite ſide, by which it applies eaſily to the inſide of the patient's thigh. *C D*, Two tubes for fixing two pieces of tape, by which, when the penis is put into the neck of the inſtrument, it may be tied to a circular bandage round the body; and the tube *F* ſerves to fix a piece of tape for tying the inſtrument round the thigh of the patient.

This inſtrument, when properly fitted, ſits very eaſily, and has frequently proved very uſeful to patients who could not retain their urine, and with whom the jugum, for the reaſons we have formerly enumerated, could not be employed.

A receptacle of this kind, of a ſize ſufficient to contain three or four gills, may be ſo adapted to the thigh as to admit of every neceſſary exerciſe.

Fig. 3. A bandage, originally invented by Mr. Gooch, for retaining the rectum in caſes of prolapſus ani. *F*, a plate of elaſtic ſteel covered with ſoft leather, which ought to be exactly fitted to the parts on which it reſts; and the cuſhion *T* ſhould be ſtuffed in ſuch a manner as to produce an equal and eaſy preſſure on being applied to the end of the gut after it is replaced. *G*, a ſtrap to be fixed with a buckle on the fore part of the body above the pubes; and *H H*, two ſtraps connected with the upper part of the inſtrument, which, by paſſing over the ſhoulders, and being fixed by ſmall knobs on each ſide of the buckle, ſerve to retain it exactly in its place.

PLATE XX.

[Oppoſite to page 389.]

Fig. 1. An inſtrument mentioned in page 322, originally invented by Dr. Butter, for injecting liquids into the bladder. *AA*, the handles of two thin plates of timber, which ſerve to compreſs a bladder placed between them, in which the liquor to be injected is contained. *B*, a ſtopcock of a pipe with which the bladder muſt be connected; and to the extremity of this ſhort pipe a longer tube *C* is adapted, to be inſerted into the urethra when the liquid is to be injected. Fig. 4, is a funnel for conveying the liquid into the bladder, by inſerting the ſmall extremity of it into the ſhort pipe near to *B*, on the tube *C* being removed.

Fig. 2, and 3. Two peſſaries for the purpoſe of ſupporting the prolapſed parts in caſes of a prolapſus uteri, and for compreſſing the urethra in caſes of an incontinence of urine. Before being introduced, they ſhould be well covered with any emollient ointment, or with ſweet oil; and they ſhould be made to lie directly acroſs the diameter of the vagina, ſo as to ſupport the prolapſed parts as much as poſſible. Theſe inſtruments may be made of any timber capable of receiving a fine poliſh: But much attention, we may remark, is neceſſary to this circumſtance; for unleſs they be made perfectly ſmooth, they cannot poſſibly be uſed. Theſe peſſaries, when a patient can admit of them, tend to ſupport the relaxed parts better than any other; but even with the utmoſt attention to their being thoroughly poliſhed, they frequently produce ſo much irritation as to become altogether inadmiſſible.

When peſſaries of this kind cannot be employed, other inventions have been propoſed. Peſſaries compoſed of the reſina elaſtica, are in general found to ſit eaſily; and they commonly anſwer, for ſome time, the purpoſe of ſupporting the relaxed parts; but as they become ſoft and glutinous by long immerſion

merſion in the natural mucus of the vagina, they ſoon loſe that elaſticity which a continued ſupport of theſe parts requires. A piece of ſoft ſponge being immerſed in common glue, or in melted bees wax, and being kept in a compreſſed ſtate till cold, and being then cut into a proper form, and inſerted into the vagina, commonly expands ſo much on the wax or glue melting, as to afford in moſt caſes a very effectual and eaſy ſupport to the relaxed parts: And in order to render the application of the ſponge ſtill more eaſy, it ſhould be previouſly covered with a ſmall bag of ſoft waxed linen, which prevents the ſponge when it expands from fretting the ſides of the vagina, which it is otherwiſe ready to do.

Peſſaries of every kind, before being introduced, ought to have a piece of firm packthread or catgut tied to them, which by hanging out from the vagina, admits of their being more eaſily removed than they otherwiſe can be.

A great variety of inſtruments have been propoſed by different authors for the purpoſe of preventing a prolapſus uteri; but theſe in general have been of a very complicated nature, and have never anſwered the purpoſe ſo eaſily as one or other of thoſe we have now mentioned.

Plate XXI.

[Oppoſite to page 397.]

Fig. 1. A trocar of a flat form, which may be introduced into the abdomen or ſcrotum with much eaſe, and with no riſk to the contained parts. This inſtrument conſiſts of a ſtilette or perforator, fig. 3, exactly adapted to the ſilver canula, fig. 2. The canula is left open on one ſide, which admits of the perforator being broader through its whole length, as is repreſented in fig. 1. By this means an opening is made by the perforator, of a ſufficient ſize for admitting the canula with much eaſe; and as the ſides of the canula do not fall cloſe together on the perfo-

rator

rator being withdrawn, this inſtrument is not liable to an objection which has been adduced againſt the trocar of Mr. André, repreſented in Plate X, Vol. I. viz. there being ſome riſk of the ſteel plates of which the canula of that inſtrument is compoſed doing ſome injury to the contents of the abdomen, on their falling together, which they do with ſome force on the perforator being withdrawn. The inſtrument of which I now give a repreſentation, is the invention of Mr. Wallace ſurgeon in Glaſgow.

Fig. 4. A trocar of a common triangular form, for the purpoſe of puncturing the bladder where this operation is neceſſary in caſes of ſuppreſſion of urine. The round or triangular form of this inſtrument renders it more proper for this operation than the trocars with lancet points, as the fine points of theſe are not ſo well adapted for the different ſteps of the operation. And the groove in the perforator, by commencing at the point, and being continued through the whole of it, ſerves to point out with much certainty its entrance into the bladder; for the urine is obſerved to flow along this groove immediately on the point of it having entered the bladder.

Fig. 5. A flat ſilver canula, with a ſmall degree of curvature for leaving in the opening after the operation for the empyema.

END OF VOLUME I.

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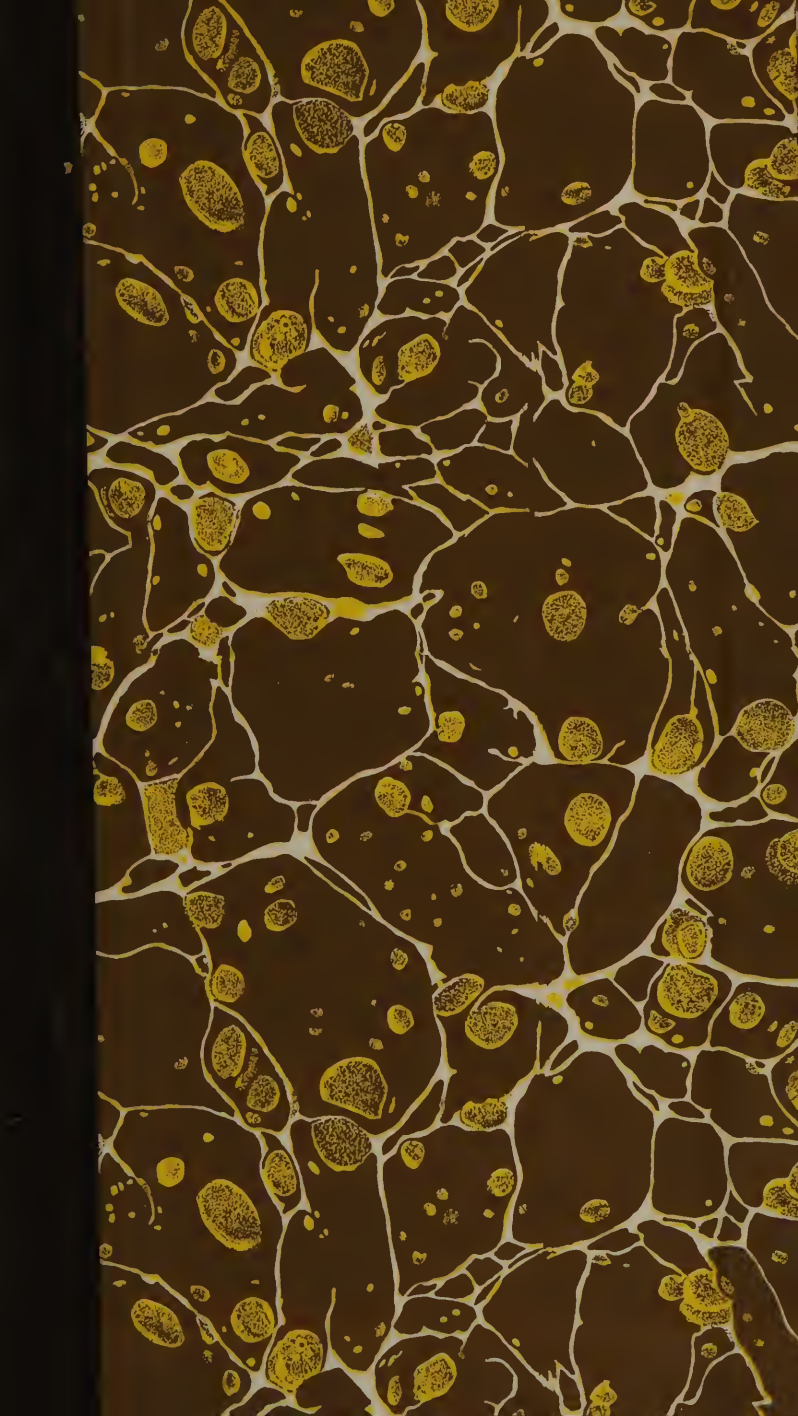
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